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Journal OF THE AMERICAN DIETETIC ASSOCIATION

VOL. 25, NO. 11 NOVEMBER 1949

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The Purchase of Foods According to Specifications

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The Role and Sources of Vitamin B_{12}[1]

A. M. HARTMAN, L. P. DRYDEN, and C. A. CARY

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A FEW years ago we reported that milk and milk products containing the non-fat solids of milk, liver extracts, and certain other foods and feeds contain a chemically still-unidentified nutrient X. The principal protein in our basal X-deficient ration was a casein (Casein C) prepared according to the method of Nelson and Jones (1) for vitamin A assay work, but the same results were obtained with heat-coagulated egg white as the source of protein, and similar results may be obtained with soybean oil meal or defatted, deglanded cottonseed flour.

If one feeds an X-deficient ration to weanling stock rats, the results may vary considerably. We have obtained differences of about 50 per cent in the post-weaning rate of growth of the young on X-deficient diets, as a result of feeding liver extract to mother rats. We have, therefore, attempted to control the preparation of test young by placing the mothers at parturition on an X-deficient ration (BR) or on BR with 15 per cent lactose substituted for dextrin or 1 per cent sulfasuxidine substituted for dextrin.

When we fed BR with 25 per cent protein (20 per cent Casein C, 5 per cent yeast protein) to weanling rats reared by mothers fed a similar X-deficient ration, the young grew at a rate about 56 per cent of normal—taking as "normal" the growth of litter mates fed this ration supplemented with doses of liver extract that were approximately maximally effective[2]. This 56 per cent is the average of several hundred pairs of litter mate rats fed without and with this liver supplement (2, 3).

When we recently fed a maximally effective dose of crystalline vitamin B_{12} in comparison with a maximally effective dose of liver extract as a supplement to this X-deficient ration containing 25 per cent protein (3, 4), the rates of growth of our rats in both cases more than doubled, and there was no significant difference between the effect of these supplements. These results indicate: (a) that our basal ration was deficient in B_{12}, (b) that the only effective growth-promoting material in the liver extract was B_{12} or B_{12}-active material, and (c) that feeding mother rats a B_{12}-deficient diet markedly retarded the post-weaning growth of their young on such diets.

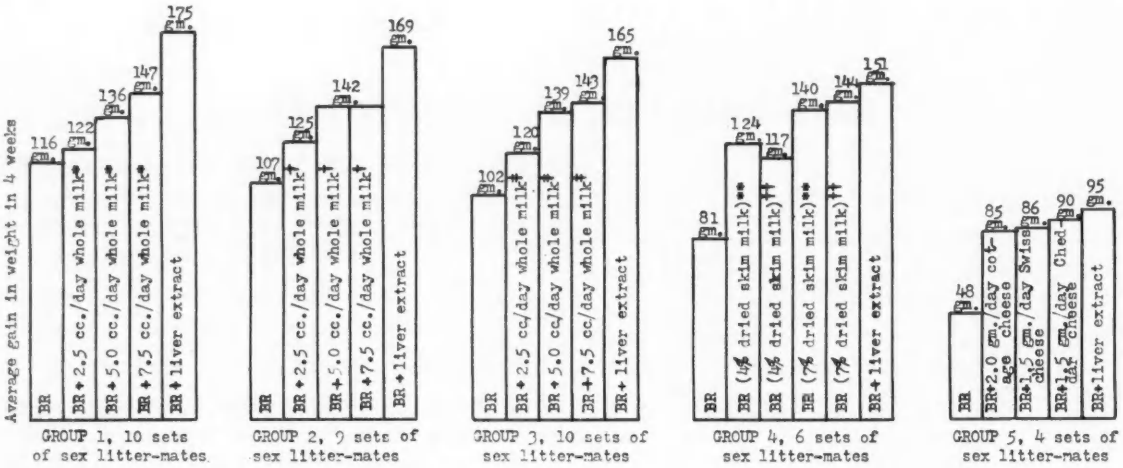
B_{12} ACTIVITY IN DAIRY PRODUCTS

When commercial casein was fed in place of Casein C in our B_{12}-deficient, 25-per-cent-protein ration, the rate of growth was normal or very nearly normal (3). When we precipitated casein from sweet skim milk by dialyzing the milk for eleven days against water and fed 1 per cent of this casein in our B_{12}-deficient ration in place of 1 per cent Casein C, there was an increase of 35 per cent in rate of growth; with 2 per cent of this dialyzed casein, the rate was nearly 70 per cent greater than with Casein C alone (3). We tested no levels of this casein between 2 per cent and 10 per cent, but, when 10 per cent was fed in our basal ration in place of an equal amount of Casein C, the growth was fully normal (3) and therefore fully as great as with the Casein C ration plus a maximally effective dose of B_{12}. Apparently some casein preparations contain a chemically still-unidentified material, which under the circumstances is non-dialyzable and which supplies either B_{12} or some material which functions directly or indirectly like B_{12} in the normal mammal. The B_{12}-active material in the liver extracts that we used was in part, if not entirely, dialyzable.

When we fed this B_{12}-active casein in comparison with an equivalent amount of the original skim milk (dried *in vacuo* at room temperature), both the casein and the skim milk were about equally active (3). It appears, therefore, that the B_{12} activity of the casein accounted for a very large part, if not all, of the B_{12} activity of this dried skim milk.

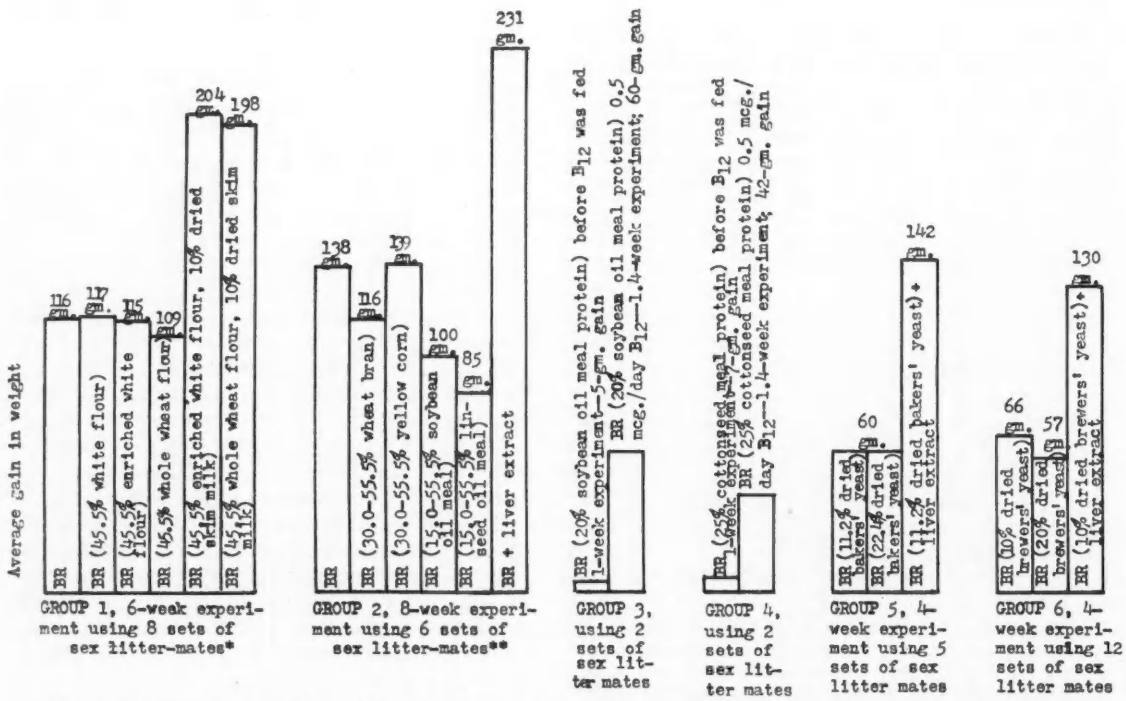
[1] This work was supported in part by an allotment from Bankhead-Jones Special Research Funds. Received for publication July 15, 1949. This paper covers in part material presented by the authors in the Symposium on Vitamin B_{12} and Related Factors at the 116th meeting of the American Chemical Society in Atlantic City, September, 1949—Abstracts, page 39A, No. 73. The form of the figures presented here has been altered to conform to the style of this JOURNAL.

[2] The liver extracts used in all of the experiments described in this paper were commercial, 15-unit, anti-pernicious-anemia preparations.



*From cows fed alfalfa hay, timothy hay, grain, and carrots.
†From same cows fed alfalfa hay, timothy hay, grain, and pasture.
‡From another group of cows fed grain and corn silage.
**From cows on dry feed.
††From cows on pasture.

FIG. 1. *Nutrient X (or vitamin B_{12}) activity of milk and milk products, as indicated by rat-growth experiments.*


Average gain in weight
116
117
115
109
204
198
BR
BR (45.5% white flour)
BR (45.5% enriched white flour)
BR (45.5% whole wheat flour)
BR (45.5% enriched white flour, 10% dried skim milk)
BR (45.5% whole wheat flour, 10% dried skim milk)
GROUP 1, 6-week experiment using 8 sets of sex litter-mates*
138
116
139
100
85
231
BR
BR (30.0-55.5% wheat bran)
BR (30.0-55.5% yellow corn)
BR (15.0-55.5% soybean oil meal)
BR (15.0-55.5% linseed oil meal)
BR + liver extract
GROUP 2, 8-week experiment using 6 sets of sex litter-mates**
BR (20% soybean oil meal protein) before B_{12} was fed
1-week experiment—5-gm. gain
BR (20% soybean oil meal protein) 0.5 mcg./day B_{12}—1.4-week experiment; 60-gm. gain
GROUP 3, using 2 sets of sex litter mates
BR (25% cottonseed meal protein) before B_{12} was fed
1-week experiment—7-gm. gain
BR (25% cottonseed meal protein) 0.5 mcg./day B_{12}—1.4-week experiment; 42-gm. gain
GROUP 4, using 2 sets of sex litter mates
60
142
BR (11.2% dried bakers' yeast)
BR (22.4% dried bakers' yeast)
BR (11.2% dried bakers' yeast) + liver extract
GROUP 5, 4-week experiment using 5 sets of sex litter mates
66
57
130
BR (10% dried brewers' yeast)
BR (20% dried brewers' yeast)
BR (10% dried brewers' yeast) + liver extract
GROUP 6, 4-week experiment using 12 sets of sex litter mates

*The flours replaced equal quantities of the dextrin in the basal ration. All of the rations were adjusted so as to contain the same levels of protein, lactose (5%), total carbohydrate, yeast, vitamins A, D, and E, and approximately the same levels of salts and fat; the salts and small amounts of fat in the flours were disregarded in making these adjustments.
**The grains and grain products replaced equal quantities of dextrin in the basal ration.

FIG. 2. *Supplementary effect of milk products, liver extract, and vitamin B_{12} on growth of rats fed diets deficient in nutrient X or vitamin B_{12}.*

When doses of 2.5 cc., 5 cc., and 7.5 cc. whole milk were fed as supplements to our B_{12}-deficient ration, the rate of growth in general increased with each increase of dose (Fig. 1, Groups 1, 2, and 3). This was true with milk from cows on barn feeds as well as with milk from cows on pasture; it was also true with milk from cows that for years had been on feeds in which we were unable to detect any B_{12} activity (Fig. 1, Group 3). We were unable to demonstrate clearly any difference in the B_{12} potency of the milks we tested, but this problem should be studied further.[3]

When varying percentages of different dried skim milks were fed in our B_{12}-deficient ration, it was found that 4 per cent produced a decided increase in growth and 7 per cent gave fully normal growth (Fig. 1, Group 4). Various cheeses gave excellent results as sources of B_{12} (Fig. 1, Group 5). We would, therefore, conclude that milk, dried skim milk, and cheeses possess what we would call B_{12} activity or potency in the normal mammal.

B_{12}-DEFICIENT FOODS

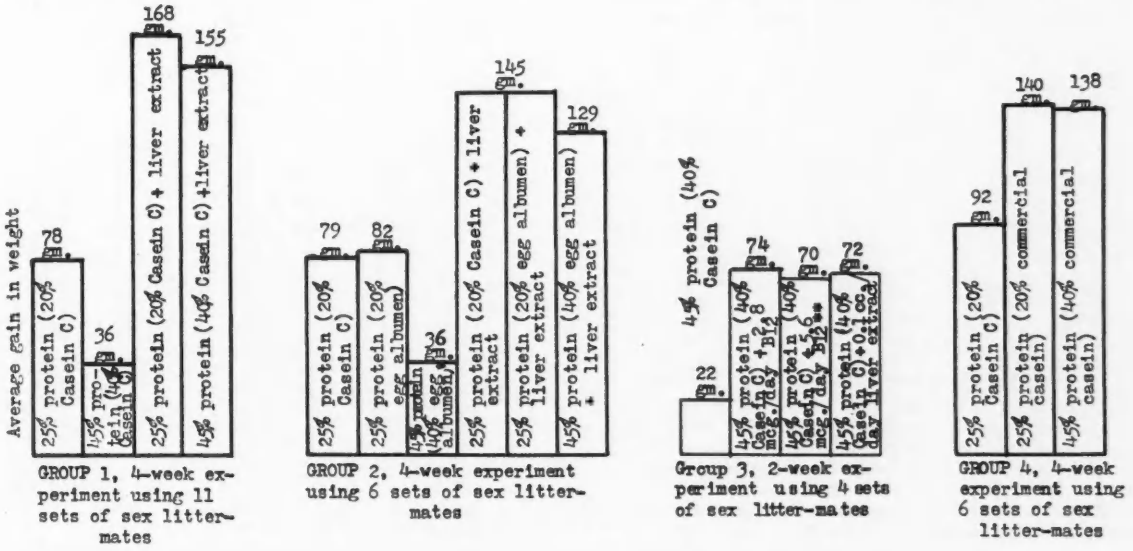
We formerly compared rats fed our B_{12}-deficient ration with rats fed this ration containing 45.5 per cent white flour, or 45.5 per cent enriched white flour, or 45.5 per cent whole wheat flour as sources of X. The rates of growth in all cases were practically the same and about one-half of normal. But, when we fed 10 per cent dried skim milk in the enriched white flour and whole wheat flour rations, the rates of growth were nearly doubled (Fig. 2, Group 1). We interpret these results now to mean that none of these flours possess appreciable amounts of B_{12} activity, and that they may be supplemented in this respect by skim milk. Corn meal, wheat bran, and the oil meals likewise were found to be very deficient in B_{12} (Fig. 2, Groups 2, 3, and 4). The yeasts we have tested have also contained no amount of B_{12} that could be detected with the rat (Fig. 2, Groups 5 and 6). The growth rates of rats on rations in which the protein was supplied by soybean oil meal or by defatted, deglanded cottonseed flour increased eightfold and fourfold respectively when they were fed a supplement of B_{12} (Fig. 2, Groups 3 and 4).

Obviously some foods and feeds are very deficient in B_{12}. On the other hand, milk, dried skim milk, and cheeses are effective supplements for such foods and feeds.

RELATION BETWEEN PROTEIN AND B_{12}

In our earlier work we obtained about one-half as good growth when we fed 45 per cent protein in our X-deficient rations as when we fed 25 per cent, i.e., the rates of growth with 45 per cent protein in these rations were only 25 to 30 per cent as great without a supplement of liver extract as with it (Fig. 3, Groups 1 and 2). Recently we have fed maximally effective doses of B_{12} and liver extract as supplements to a 45 per cent protein ration (Fig. 3, Group 3). The rate of growth with each supplement was more than tripled, and the increase was the same with each. When a B_{12}-active casein was fed in place of

[3] Since this paper was written, we have obtained data on the dose-growth response of vitamin B_{12}. From these data and those in Figure 1, we calculate that 1 qt. milk, when fed to a normal rat, has a potency equivalent of 10 or 12 mcg. crystalline B_{12}.


Average gain in weight
78
36
168
155
25% protein (20% Casein C)
45% protein (40% Casein C)
25% protein (20% Casein C) + liver extract
45% protein (40% Casein C) +liver extract
GROUP 1, 4-week experiment using 11 sets of sex litter-mates
79
82
36
145
129
25% protein (20% Casein C)
25% protein (20% egg albumen)
45% protein (40% egg albumen)
25% protein (20% Casein C) + liver extract
25% protein (20% egg albumen) + liver extract
45% protein (40% egg albumen) + liver extract
GROUP 2, 4-week experiment using 6 sets of sex litter-mates
22
74
70
72
45% protein (40% Casein C)
45% protein (40% Casein C) + B12
45% protein (40% Casein C) + 5.6 mcg./day B12**
45% protein (40% Casein C)+0.1 cc. day liver extract
Group 3, 2-week experiment using 4 sets of sex litter-mates
92
140
138
25% protein (20% Casein C)
25% protein (20% commercial casein)
45% protein (40% commercial casein)
GROUP 4, 4-week experiment using 6 sets of sex litter-mates

**9 sets of rats started; 3 rats on this ration died during the experiment.
**Only 2 rats fed this diet.

FIG. 3. *Deleterious effect on growth of feeding high levels of protein in diets deficient in nutrient X or vitamin B_{12}, and the supplementary effect of milk products and of other sources of X (or B_{12}) activity.*

Casein C in this 45 per cent protein ration as a source of the B_{12}-active material in milk, the rate of growth was practically normal (Fig. 3, Group 4), thus again emphasizing the importance of this B_{12}-active material in milk and milk products.

With X-deficient rations containing 65 per cent protein, we had found that our rats either failed to grow or failed to survive, but that when a supplement of the liver extract was fed in addition, good growth resulted (Fig. 4, Group 1). Upon repeating this experiment with our 65 per cent protein ration and this ration supplemented with maximally effective doses of B_{12} or liver extract, the growths were 4 gm., 53 gm., and 55 gm., respectively (Fig. 4, Group 2). Again, with this high-protein ration, the feeding of a B_{12}-active casein increased the rate of growth manyfold (compare Groups 3 and 2).

Obviously the feeding of high levels of protein in B_{12}-deficient rations is very deleterious—may even be fatal—and B_{12}, liver extracts, and the B_{12}-active material in milk tend to overcome this effect when fed as supplements to or in such rations. Even on protein-deficient rations (10 per cent protein) that are deficient also in B_{12}, rats doubled their rates of growth when fed supplements of B_{12} (3, 4). We believe these results indicate that B_{12} plays an important role in determining the capacity of the normal mammal to utilize protein. It taxes one's imagination, however, when he attempts to correlate the magnitude of the effect of B_{12} with the dose. With 25 per cent protein, we have obtained a significant increase in the rate of growth of rats with a dose of 0.01 mcg. per day (3, 4); and it seems probable the maximally effective dose with the growing female rat is not over 0.4 mcg. per day, and with the male 1.0 mcg. or possibly 2.0 mcg. per day.

EFFECT OF LACTOSE AND B_{12} ON GROWTH

In some experiments with X we had fed pure crystalline lactose in our X- (or B_{12}-deficient) rations. It had a depressive effect on the rate of growth; but, with a 25 per cent lactose ration, liver extract overcame this effect and increased the rate of growth of the rats about 167 per cent (Fig. 5, Group 1). We have repeated this experiment with 25 per cent lactose, using B_{12} in place of liver extract. B_{12} obviously had the same effect as liver extract (Fig. 5, Group 2).

Despite the fact that our 25 per cent protein

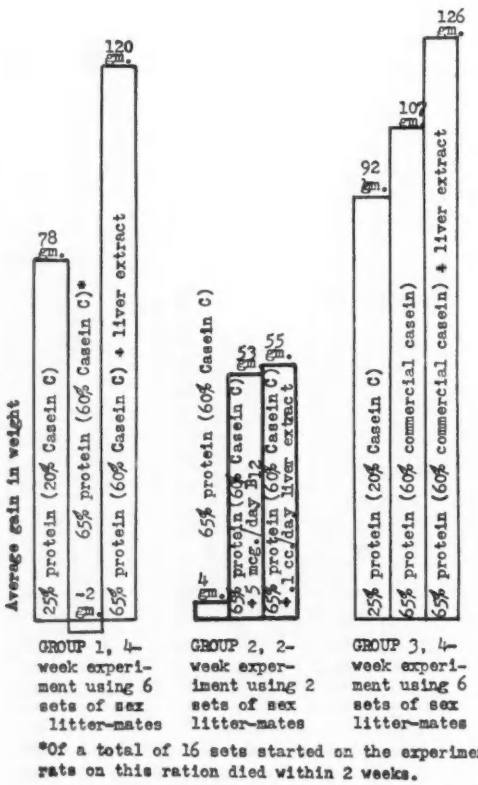

Average gain in weight
78
120
4
53
55
92
107
126
25% protein (20% Casein C)
65% protein (60% Casein C)*
65% protein (60% Casein C) + liver extract
65% protein (60% Casein C)
65% protein (60% Casein C) + 5 mcg./day B12
65% protein (60% Casein C) + .1 cc./day liver extract
25% protein (20% Casein C)
65% protein (60% commercial casein)
65% protein (60% commercial casein) + liver extract
GROUP 1, 4-week experiment using 6 sets of sex litter-mates
GROUP 2, 2-week experiment using 2 sets of sex litter-mates
GROUP 3, 4-week experiment using 6 sets of sex litter-mates
*Of a total of 16 sets started on the experiment, 10 rats on this ration died within 2 weeks.

FIG. 4. *Deleterious effect on growth of feeding high levels of protein in diets deficient in nutrient X or vitamin B_{12}, and the supplementary effect of milk products and of other sources of X (or B_{12}) activity.*

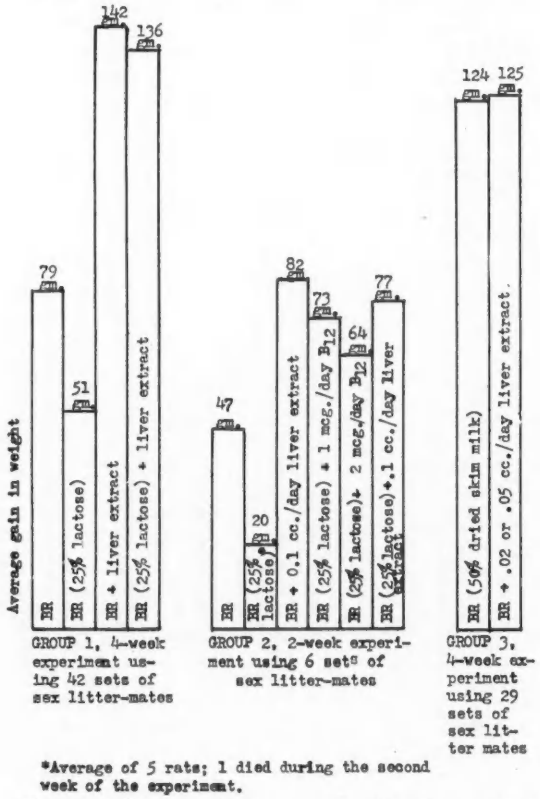

Average gain in weight
79
51
142
136
47
20
82
73
64
77
124
125
HR
HR (25% lactose)
HR + liver extract
HR (25% lactose) + liver extract
HR + 0.1 cc./day liver extract
HR (25% lactose) + 1 mcg./day B12
HR (25% lactose)+ 2 mcg./day B12
HR (25% lactose)+.1 cc./day liver extract
HR (50% dried skim milk)
HR + .02 or .05 cc./day liver extract.
GROUP 1, 4-week experiment using 42 sets of sex litter-mates
GROUP 2, 2-week experiment using 6 sets of sex litter-mates
GROUP 3, 4-week experiment using 29 sets of sex litter mates
*Average of 5 rats; 1 died during the second week of the experiment.

FIG. 5. *Deleterious effect on growth of feeding purified lactose in diets deficient in nutrient X or vitamin B_{12}, and the supplementary effect of milk products and of other sources of X (or B_{12}) activity.*

TABLE 1

Foods and feeds which have and which do not have nutrient X (or vitamin B_{12}) activity in the normal mammal

FOODS AND FEEDS WHICH DO *not* POSSESS NUTRIENT X OR VITAMIN B_{12} ACTIVITY	FOODS AND FEEDS WHICH *do* POSSESS NUTRIENT X OR VITAMIN B_{12} ACTIVITY
White flour	Milk
Enriched white flour	Skim milk (liquid or dried)
Whole wheat flour	Cheese (cottage, Swiss, Cheddar)
Yeast (bakers' or brewers')	Casein, crude
Wheat bran	Liver extracts
Cornmeal (yellow)	Beef muscle
Soybean oil meal	Pork muscle
Linseed oil meal	Egg yolk
Cottonseed flour (deglanded, defatted)	Lettuce
Corn silage	Alfalfa or alfalfa hay
Distillers' dried solubles	Timothy hay
Carrots	Kentucky blue grass
Tomatoes	Rice polishings concentrate
Egg white (heat-coagulated)	
Butterfat	

ration containing Casein C gave only 56 per cent normal growth and that this growth was still further depressed when 25 per cent purified lactose was fed in it, it is clear (Fig. 5, Group 3) that when we fed 50 per cent dried skim milk which supplied 19 per cent protein and 25 per cent lactose), the growth of our rats was the same as with the Casein C ration containing dextrin and supplemented with an approximately maximally effective dose of liver extract (Fig. 5, Group 3). This illustrates how the B_{12} activity of milk enables the animal to use effectively the lactose and casein in it, and how erroneous the results might be if the nutritive properties of these milk constituents were tested separately from milk.

EFFECT OF B_{12} ON REPRODUCTION AND LACTATION

We have not yet repeated our reproduction and lactation experiments with our X-deficient rations using B_{12} in place of liver extract.[4] In our previous studies of the organ weights of X-deficient rats, the ovaries and uteri were found to be reduced in size much more than proportionately to the body weight (3). When we determined the ages at which vaginal patency occurred with rats placed at about twenty-one days of age on our X-deficient rations and on these rations plus liver extract, we found these ages to be, respectively, fifty-four days and thirty-five days, on the average (3). We have recently obtained similar results with B_{12} (3).

It is clear that B_{12} plays an important role in the growth and development—and probably in the reproduction and lactation—of the normal mammal.

INTESTINAL SYNTHESIS OF B_{12}

About two years ago we obtained results which indicated that, under certain dietary conditions, rats may grow as well on a diet deficient in X, or B_{12}, as with such a diet supplemented with liver extract (169 gm. gain in four weeks). When we followed up this finding we obtained strong circumstantial evidence which we believe indicates that this was because under such dietary conditions bacteria which either synthesize B_{12} or some B_{12}-active material may thrive in the intestine of the rat. On going into the matter still further, we came to the conclusion that exceedingly high levels of riboflavin play a very important—if not a dominant—role in bringing about this synthesis.

It may be said that no one is likely to feed in practice the diets we fed in these experiments; on the other hand it is, of course, possible that other dietary conditions not yet known may also be found to affect this synthesis. The synthesis of B_{12}-active material by bacteria has been shown by other workers to occur *in vitro*.

SUMMARY

In Table 1 are given the results obtained when various foods and feeds have been tested for X or B_{12} activity by feeding them in or as a supplement to our basal rations.

B_{12} undoubtedly plays a very important role in the nutrition of the normal mammal; some of our foods and feeds are deficient in B_{12}; milk, dried skim milk, and various kinds of cheese are sources of B_{12} in the normal mammal; and milk and these milk products supplement the B_{12} deficiency of the cereal grains, oil meals, yeasts, and so on. Our results apply only to the normal mammal. When milk is considered clinically in connection with pernicious anemia, it is listed among those foods containing the "extrinsic" factor.

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[4] Since this manuscript was submitted for publication, we have shown that a large percentage of the young rats borne by mothers on B_{12}-deficient rations fail to survive more than a few days, and that the feeding of a supplement of B_{12} to the mothers corrects this condition.

Children's Nutritional Needs During Growth and Development[1]

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GROWTH, development, food needs, and feeding problems are so basically interrelated in early life that all must be taken into account in giving dietary advice for infants and children. Food needs and feeding problems change frequently during these years because infants and children are constantly changing in a variety of ways. The young individual is not only small, but he is growing; is not only immature, but he is developing; is not only inexperienced, but he is learning. It is because of the complexities of these interrelationships, and the ever-changing food needs and feeding problems of children, that giving mothers advice requires so much knowledge and experience. Food needs are most closely related to size and rate of growth; feeding problems are more dependent upon stage of maturity and learning. Both are influenced, however, by anatomic, physiologic, and psychologic aspects of development.

The general features of growth and development at each age from conception to maturity must be appreciated if the nature of food needs is to be understood and feeding problems are to be handled wisely. So also, an adequate diet is essential to the normal progress of growth and the maintenance of satisfactory nutritional processes. These are important not only to the normal progress of development, but they are important also in relation to present and future health. The appraisal of growth status and of progress are the principal means of recognizing infants and children who require special attention to diet.

The young of the human species grow and develop according to certain well recognized patterns so that within narrow age periods one may generalize about children of the age group specified. On this basis, one may establish dietary allowances for infants, preschool children, school children, and adolescents of average size. This is the method adopted by the Food and Nutrition Board of the National Research Council in preparing its table of Recommended Dietary Allowances. Familiarity with the usual characteristics and needs of children of given ages is of the utmost importance for those who are to deal with them, but many children fail to follow the usual course of growth and development sufficiently closely to make general recommendations entirely applicable to them. Children of the same age not only differ greatly in size and developmental accomplishments, which are relatively easily recognized, but also in rate of growth and in speed of maturation—features which are appreciated only when periodic assessments permit evaluation of progress. It is important, therefore, during the first two decades of life to realize also the extent of differences between children in the magnitudes and in the timing of these occurrences and to appreciate the effects of these differences upon food needs and feeding problems. Sound dietary advice must be based upon consideration of the child's progress of growth and development against that considered appropriate for him, and not merely upon recommended allowances for sex and age.

PERIODS OF GROWTH PROGRESS

The following characteristics of growth progress are presented to illustrate the effects of changing rates of growth upon dietary needs.

(a) Although developmental changes are taking place very rapidly during the first trimester of pregnancy, fetal growth in size is quantitatively very small. In the third trimester, however, it is very rapid, in fact, the most rapid three-month period prior to adolescence. Hence, the nutritional requirements of the fetus are greatest during this period. The first three months after birth are the next most rapid period of growth and one during which there are adaptations to the taking and assimilation of food. Hence, it is the period of postnatal life with the highest food requirements per unit of body weight and the greatest need for careful dietary supervision.

(b) Following this fetal-infant cycle of very rapid growth, the rate of growth diminishes steadily to

[1] Presented at the 31st Annual Meeting of the American Dietetic Association in Boston, on October 21, 1948.

the lowest level of childhood at about two to three years of age and continues at a plateau for a variable period, usually two to three years, after which it accelerates gradually throughout childhood proper. Hence, food needs per unit of body weight are relatively low during these years, compared with the earlier and later periods. The importance of these facts in relation to the development of sound dietary habits and the effects of emotional problems on growth and nutrition should be considered.

(c) With the onset of adolescence, usually between ten and twelve years in girls and twelve and fourteen in boys, growth in all dimensions begins to accelerate and this continues to a maximum peak of gain about two years later, after which the growth rate diminishes quickly. During this adolescent cycle of rapid growth, the nutritional requirements reach a maximum for males and, with the exception of periods of pregnancy and lactation, for females also.

(d) It is natural for all children to accumulate relatively more fat in their tissues during the rapid periods of growth in mid-infancy and mid-adolescence than at other ages. Hence, for those who tend to be obese, these are the ages at which excessive calories which do not provide for structural needs must be avoided.

(e) The late adolescent period, after growth in height has begun to diminish, is one of rapid growth of muscles, especially in boys. During this entire period the nutritional needs, particularly for adequate protein, continue to be high.

(f) Despite the tendency for all children to follow the patterns of growth described above, the magnitudes of gain by age periods are so different between individuals in relation to body build, speed of maturation, and so on, that it is necessary to consider the individual pattern of growth in estimating dietary needs, and not to rely solely on age and actual weight.

FACTORS WHICH INFLUENCE INDIVIDUAL VARIABILITY

The physician usually has the task of determining whether a child's progress in growth has been satisfactory or whether his present state represents retardation or abnormality. This is often a difficult undertaking because a state which may be entirely appropriate, or at least the best possible, for one individual on the basis of genetic constitution may represent a condition far less than appropriate or possible for another. The recognition of these differences is particularly difficult at a single examination when the regularity of past progress is not known. The most common and recognizable difference between genetically determined and nutritionally or other environmentally determined patterns of growth is the consistency of the former in contrast to the irregularity of the latter.

It is important to realize that a number of different conditions influence a child's physical condition and the progress of his growth. Diet is only one of these, although a very important one, but all the possible explanations should be considered. Retarded growth should be looked upon as a non-specific sign of malnutrition in childhood. It is probably the most common physical sign of general and prolonged undernutrition and usually is unaccompanied by any signs which can be considered as indicative of a deficiency of one or more specific nutrients.

In attempting to determine what part diet has played in bringing about retardations in growth and development, or in lack of physical fitness for age in childhood, the following features of individual differences should be recognized:

(a) Body build. Body build is primarily determined genetically, although it may be modified to some extent by chronic illness in early life or by prolonged malnutrition.

(b) Body size. Size is determined in part by build and hence genetically. It may be modified by internal factors developing after conception, such as changes in the activities of certain of the endocrine glands. It may be markedly affected by a variety of illnesses, by congenital defects, and to a very large extent by dietary habits.

(c) Rate of maturation or stage of physical development for age. This characteristic again is in some measure related to build and is strongly influenced by genetic or familial trends. Acquired differences in endocrine activities may also be involved. There is considerable evidence, however, that prolonged dietary inadequacies may retard physical maturation.

(a) Physical activity. Individual differences in physical activity may in part be constitutional, but they are in large measure the consequence of social and other environmental factors. One of the adaptations to caloric undernutrition is a reduction of activity. Lack of an appropriate diet to permit normal growth of muscles unquestionably modifies physical activity.

(e) Illness. Illness affects growth and development in a variety of ways—by interfering directly with the nutritional processes or by interfering indirectly through reduction of appetite and food consumption. Furthermore, food needs may be greatly increased by illness at the same time that food intake and utilization are greatly decreased. Malnutrition and retarded growth commonly stem from prolonged or repeated illness, doubtless to a considerable extent because of their effects upon diet.

(f) Efficiency of the nutritional processes. This is determined by constitutional factors, by adaptations to habitual circumstances, by defects, and by illnesses.

Feeding problems tend to be the outgrowth of special food needs or relatively high food requirements or mismanagement of a child in consideration of his physiologic and psychologic needs determined

by his maturity. The margin of safety between food requirements and food tolerance may be relatively narrow due to these factors. Many emotional problems relate to feeding or affect food intake, especially during early life. These are concerned with matters of learning, dependence, authority, lack of choice, and so on. Emotional disturbances, as well as faulty habits, have much to do with habitual food consumption and hence with growth and development. They affect the physiologic processes and, therefore, the efficiency of food utilization. Unwise dietary management, as well as poor general training and care for age or stage of development, account for many of the feeding problems of early life. The psychologic aspects of child feeding must be dealt with on the basis of an understanding of the emotional maturity and mental status of the individual, as well as of the precipitating causes of any difficulties encountered. Therefore, the nutritionist who deals with the young must acquire understanding and skill in the realm of child psychology.

If the genetic constitution of a child is favorable for the attainment of satisfactory physical development and fitness, his actual physical status at any one time will depend to a considerable degree on the adequacy of his diet. If a child is not fully developed or physically fit because of prolonged faulty feeding, a liberal diet will be required continuously over a long period to permit full restoration of appropriate physical status. Hence, physically underpar or retarded children deserve particular attention to diet, whether or not the condition is primarily due to faulty diet. This attention should include careful consideration of his deficits and careful following of his progress. Attention must never be confined to dietary factors, however, until all organic causes for failure to progress normally have been investigated and treated as indicated. Furthermore, social and psychologic difficulties must not be overlooked. Therefore, in dealing with nutritional problems in childhood, the best results may be anticipated if problems of growth and development are fully appreciated and the physician and nutritionist work together, often in conjunction with a psychologist and social worker.

Eating Habits of Children

The increment of growth in the first few months of life is much steeper than in the latter part of the first year, and most infants eat avidly in the first few months. As the rate of growth slows, the appetite gradually drops off and the anxious or emotional type of mother is likely to force her infant beyond its appetite and actual food requirements. The mother at once is convinced that her infant not only is refusing all milk, but all food offered. Hence many mothers honestly make this claim and feel that their baby is starving; it is usually most difficult to convince them that the baby is of average, or above average nutrition.

The first practical measure is to convince the mother that the infant is in good nutrition. Second, convince her that the amount of food the infant needs will depend on how fast the baby has grown. Third, convince such a mother that the amount of food the baby actually wants will probably be the amount that the infant needs, rather than the amount which she has decided the baby should have.

The following items from "Children Like to Eat," published by the Children's Bureau, Washington, D. C., are practical points which will aid an emotional mother in feeding her baby: (a) Children will eat if you "let" them. (b) Do not force food. (c) Let the child's need determine how much he wants. (d) Help him to help himself. (e) Watch when he is ready to take the next step. (f) Have pleasant surroundings. (g) Be casual, friendly, patient. (h) Don't scold, nag, fuss. (i) Respect your child's likes and dislikes.—*In Queries and Minor Notes, J. A. M. A. 140: 1311 (August 20), 1949.*

Effect of Growing Conditions on Nutritive Value of Foods

There have been many misstatements regarding the influence of soil on the nutritive content of foods. Fertilization of the soil may widen the kinds of crops that can be grown, but the evidence is negative that such fertilization will improve the nutritive value of a specific food to any extent. In some cases when the yield per acre was increased, the nutritive content of individual plants decreased.

Climatic conditions seem to have much more influence on nutritive content than does the soil. Different strains of the same variety have differing nutritive content. Probably the greatest improvement in nutritive content will come from breeding plants high in nutritive content.—*Excerpt from an address by Dr. L. A. Maynard given at the Third Community Nutrition Institute, conducted jointly by the College of Home Economics, Syracuse University, and New York State Department of Health, July 15, 1949.*

Biologic Studies on the Value of Dietary Supplements of Milk and Milk Products[1]

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MITCHELL and Block (1) have pointed out that, using modern methods of determining the indispensable amino acids in proteins and in the protein-mixtures of foods, it is possible to arrive at the approximate nutritional potentiality of the protein components. However, even though amino acid analyses, alone, will indicate the potential protein nutritive value of a food, there are a number of conditions in which this potentiality is not reached. Thus, improper treatment, such as excessive heating, may destroy or render unavailable to the organism certain essential amino acids, especially lysine (1). They suggested that food products, whose unheated proteins ranked much lower by biologic assay than by chemical appraisal, would exhibit an improvement in biologic value on heating, while those food proteins whose biologic assays and chemical (i.e., amino acid) ratings show reasonable agreement, would exhibit a decrease in biologic value on improper heating (2).

Chemical analyses of the proteins of cow's milk indicate that cystine or methionine is the limiting factor (1). The rat growth experiments reported in the first portion of this paper were carried out to ascertain whether dried skim milk proteins were supplying essential amino acids to the organism in the quantities expected from amino acid analyses. The results showed that this excellent food did fulfill the potentialities indicated by amino acid analyses and that the addition of small quantities of equimolecular portions of cystine or of methionine augmented the biologic value of milk proteins as was predicted from amino acid analyses.

The second portion of the paper suggests what is believed to be a new approach in the evaluation of human diets. It is based on the fact that if the average daily intake of foodstuffs is known, then the adequacy of the protein portion of the diet may be calculated with reasonable accuracy from a knowledge of the amino acid composition of the various dietary components. Furthermore, if such a calculation reveals a greater deficiency in one or more of the essential amino acids than in the total protein ingested, then correction of the specific amino acid deficiencies is rendered easier by the inclusion of relatively small quantities of proteins or foods which contain an abundance of these amino acids.

[1] Received for publication May 23, 1949.

INVESTIGATION I

Effect of Cystine and Methionine Supplementation on Milk Products

To determine the effect of supplementing milk proteins with cystine and methionine, diets supplying 20, 30, and 40 per cent whole milk powder were made up for rat growth experiments. These were then supplemented with cystine and/or methionine. These diets are shown in Table 1.

Experiment 1. Each member of a pair of male rats, weighing close to 45 gm., was given either Diet *20* or *20C* (each containing 20 per cent whole milk powder) *ad libitum* for 98 days. Four pairs of rats were used.

The inclusion of 0.2 per cent cystine to a diet containing 20 per cent milk powder (5 per cent milk proteins) resulted in an average gain in weight of 90 gm. in 98 days, in contrast to a gain of 39 gm. by the control animals receiving Diet *20* which included extra choline. This finding was in agreement with the feeding experiments of Osborne and Mendel (3), of Sherman and Merrill (4), and with the calculations of Mitchell and Block (1).

Experiment 2. This experiment was similar to Experiment 1 except that 40 per cent milk powder was fed as the basal diet (Diet *40*) and the sugar was reduced from 51 to 36 per cent. One-half the animals received Diet *40C* containing 0.4 per cent cystine.

The average gain in weight for eight rats on Diet *40* for 98 days was 160 gm., while the average gain for their litter mate controls fed the same diet plus 0.4 per cent cystine was 274 gm.

Experiment 3. Male litter mates were fed one of the following diets given in Table 1: *40*, *30C*, *30M*, and *30*. Eight animals were used in each group.

In Table 2 is shown the average gain in weight of each group. It will be seen that cystine and methionine (Diets *30C* and *30M*) were equivalent in their growth-promoting properties and that either 0.3 per cent cystine or 0.4 per cent methionine were better supplements (for the rat) to cow's milk protein than a 30 per cent increase of the protein itself (Diet *30* vs. Diet *40*).

At the conclusion of the experiment, the animals were killed. The brains, livers, and intestinal tracts were removed. The latter were washed and placed with the carcasses. Samples of hair were also removed. The remainder of the carcasses were ground and thoroughly extracted with hot acetone, alcohol, benzene, and ether, then dried at 110° C. to constant weight. This residue was called protein. The organic solvents were evaporated *in vacuo* and the residue was taken up in ether. This solution was dried over sodium sulphate, and after filtration, the ether was evaporated. The ether-soluble residue was designated as fat.

In Table 2 are summarized: the weight gained, food eaten, nutritive value, weight and length of the animals at the end of the experiment, and their approximate composition in fat, protein, and water. It is seen that the addition of cystine or methionine resulted in an increase in growth rate and an increase in the nutritive value of the milk proteins for the young rat, while the percentage composition of the animal remained approximately the same.

The brains, livers, and hair from the rats on each of the four diets were treated separately, and after removal of water and lipid material by extraction with organic solvents, these proteins, as well as the carcasses, were analyzed for nitrogen and cystine. The results are summarized in Table 2. Diets low in sulphur amino acids do not cause a change in the composition of the total proteins of the carcass,

TABLE 1

Composition of diets used in studying effect of adding cystine and methionine to milk proteins

INGREDIENTS	DIET *20** (20% milk powder)	DIET *20C** (20% milk powder 0.2% cystine)	DIET *30** (30% milk powder)	DIET *30C* (30% milk powder 0.3% cystine)	DIET *30M* (30% milk powder 0.4% methionine)	DIET *40** (40% milk powder)	DIET *40C** (40% milk powder 0.4% cystine)
	%	%	%	%	%	%	%
Whole milk powder†	20.0	20.0	30.0	30.0	30.0	40.0	40.0
Crisco	20.0	20.0	15.0	15.0	15.0	15.0	15.0
Cod-liver oil	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Sucrose	51.0	50.8	46.0	45.7	45.6	36.0	36.0
Salts (Osborne and Mendel)	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Cystine	0.0	0.2	0.0	0.3	0.0	0.0	0.4
Methionine	0.0	0.0	0.0	0.0	0.4	0.0	0.0

* The following supplements were also given:

B-complex (diluted to 100 cc.):
- Ryzamin B ..... 10 gm.
- Lilly liver 343 ..... 10 gm.
- Yeast concentrate ..... 10 gm.
- Thiamine chloride ..... 10 gm.
- Riboflavin ..... 10 gm.

} 1 cc. three times a week

- Choline chloride ..... 1 gm.

Vitamins A and D:
- Cod-liver oil concentrate (Navitol, Squibb) ..... 3 drops per week

Vitamin E:
- Wheat germ oil concentrate ..... 6 drops per week

Linoleic acid ..... 3 drops per week

† Approximately 25 per cent protein.

TABLE 2

Effects of cystine and methionine supplementation of milk proteins

DIET	WEIGHT		LENGTH	FOOD EATEN	PROTEIN EFFICIENCY	CARCASS COMPOSITION			CYSTINE*			
	Total	Gain				Fat	Protein	Water	Carcass	Brain	Liver	Hair
	gm.	*gm.*	*mm.*	*gm.*		%	%	%	*gm./16 gm. nitrogen*†	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*†	*gm./16 gm. nitrogen*
30 (30% milk powder)	159	78	178	658	1.6	14	19	67	1.4	1.2	1.3	13.4‡
40 (40% milk powder)	204	123	194	660	1.9	11	19	70	1.4	1.3	1.3	14.2‡
30C (30% milk powder, 0.3% cystine)	225	138	199	692	2.4	13	20	67	1.4	1.2	1.3	15.6‡
30M (30% milk powder, 0.4% methionine)	221	141	200	640	2.8	14	20	66	1.3	1.3	1.3	16.0‡

* Determined by Folin method (13).

† Calculated.

‡ These results confirmed by the Vassel method (13).

brain, or liver, but result in a decrease in the cystine content of the hair proteins as originally reported by Lee and Lewis (5).

INVESTIGATION II

Complementary Effects of Cheese and Other Proteins

It is customary to evaluate protein efficiency either by feeding the protein food in question as the "sole" source of nitrogen in the diet or to feed the entire ration in question to the test animal. We wish here to suggest a modified approach to the problem of evaluating the complementary effect of a protein food to the components of a mixed diet. If the pattern of the essential amino acids in a diet is known, it is usually possible to prepare a mixture of a few readily available dry proteins which will furnish this pattern in a highly digestible form. Then, the protein or proteins under investigation can be incorporated into the basal ration and the effect determined by one or more methods. Several examples of this procedure are given below.

The Department of Agriculture has prepared an excellent survey titled "Family Food Consumption in the United States" (6). This pamphlet gives the quantities and kinds of foods purchased by different economic groups in the United States during 1942. It is possible to calculate, with reasonable accuracy, the quantities of each essential amino acid consumed by the average member of the several groups reported. The results of such a calculation as regards the poorest urban group appear in Table 3.

TABLE 3

Calculated amino acid content of poorest urban diet in the United States (6)

AMINO ACID	AMOUNT *gm./16 gm. nitrogen*
Arginine	5.7
Histidine	2.3
Lysine	5.3
Tryptophan	1.2
Phenylalanine	5.5
Cystine + methionine	4.0
Threonine	3.8
Leucine	8.7
Isoleucine	5.7
Valine	5.6

If a mixture of spray-dried skim milk (1610 gm.), wheat gluten (470 gm.), and zein (52 gm.) is prepared, its essential amino acid composition approaches that of the calculated pattern of the poorest urban diet (Table 4, Diet *1*).

To test the effect of replacing a portion of the proteins of Diet *1* with available protein sources, Diets *2*, *3A*, *8*, *9*, and *11* were prepared. Diet *2* consisted of Diet *1* in which 15 per cent of the protein has been replaced with 15 per cent dried liver proteins after hot aqueous extraction of the water soluble constituents. Diet *3A* was prepared by replacing 15 per cent of the proteins of Diet *1* with Cheddar cheese proteins; Diets *8* and *9* were made in the same way using 10 and 20 per cent yeast proteins respectively; while Diet *11* was made by replacing 15 per cent of the proteins of Diet *1* with lactalbumin. The calculated amino acid compositions of Diets *2*, *3A*, *8*, *9*, and *11* based upon the composition of Diet *1* and those of the adjuvants are given in Table 4.

The diets were fed to groups of ten weanling male rats averaging about 44 gm. in weight as in the experiments described above. The test materials were fed to furnish "protein" (N x 6.25) at the level of 9 per cent. The remainder of the ration consisted of Crisco, 8.0 per cent; wheat germ oil (Viobin), 2.0 per cent; salt mixture, 4.0 per cent; vitamin mixture, 0.7 per cent; and equal portions of starch and dextrose to make up to 100 per cent. The vitamin mixture in each 100 gm. of diet supplied 750 I.U. vitamin A, 150 I.U. vitamin D, 0.5 mg. thiamine, 1.0 mg. riboflavin, 1.0 mg. pyridoxine chloride, 100 mg. inositol, 5 mg. niacin, 100 mg. choline chloride, 0.01 mg. biotin, 5 mg. calcium pantothenate, 2.5 mg. para-aminobenzoic acid, 250 mg. liver extract 343, 0.1 mg. 2-methyl-1,4-naphthoquinone, and 7 mg. α-tocopherol.

The results of feeding these animals for twenty-

TABLE 4

Amino acid composition of basal diet comparable to poorest urban diet and of diets supplemented with liver, cheese, yeast, and lactalbumin

DIET	ARGININE*	HISTIDINE*	LYSINE*	TRYPTOPHAN*	PHENYLALANINE*	CYSTINE + METHIONINE*	THREONINE*	LEUCINE*	ISOLEUCINE*	VALINE*
	gm./16 gm. nitrogen	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*	*gm./16 gm. nitrogen*
1 (basal—milk, wheat gluten, zein)	4.1	2.4	5.3	1.3	5.6	4.0	3.7	10.4	6.4	6.5
2 (basal + 15% liver)	4.4	2.5	5.7	1.3	5.7	4.1	3.9	10.1	6.2	6.4
3A (basal + 15% cheese)	4.1	2.6	6.0	1.4	5.7	4.0	3.7	10.1	6.5	6.6
8 (basal + 10% yeast)	4.0	2.5	5.5	1.3	6.0	3.9	3.9	10.1	6.3	6.5
9 (basal + 20% yeast)	3.9	2.6	5.6	1.2	5.4	3.8	4.1	9.8	6.2	6.4
11 (basal + 15% lactalbumin)	4.1	2.4	6.0	1.5	5.6	4.4	3.9	10.4	6.4	6.5

* Calculated.

TABLE 5

Effects of supplementation with liver, cheese, yeast, and lactalbumin

DIET	NET GAIN	PROTEIN EFFICIENCY		CALCULATED BIOLOGIC VALUE*
		Actual	Calculated*	
	gm.			
1 (basal)	72.0 ± 3.2	2.94	2.92	85
2	83.7 ± 3.6	3.12	3.10	89
3A	97.4 ± 5.6	3.39	3.24	92
8	76.7 ± 5.1	2.90	3.00	87
9	84.9 ± 3.3	3.03	3.06	88
11	93.6 ± 4.2	3.36	3.24	92

* From lysine content (1).

eight days are summarized in Table 5. It will be seen that the replacement of a portion of the basal diet (comparable to the poorest urban group) with 15 per cent liver proteins or 20 per cent yeast proteins resulted in a significant improvement in biologic value (Fischer "t" test 2.4 and 2.8, respectively). However, the supplementary effects of 15 per cent lactalbumin or 15 per cent cheese proteins were striking. The addition of 10 per cent yeast proteins did not result in an appreciable improvement in nutritive value of Diet *1*. In Table 5 are also shown the protein efficiencies found and calculated according to the amino acid composition considering lysine to be the first deficiency (1). Mitchell and Block (1) used the essential amino acid pattern of whole egg proteins as the standard for evaluating protein efficiency and biologic value in the rat. On this basis, cystine plus methionine would be the primary deficiency in all the experimental diets except Diet *9*, and one would expect that the protein value of Diet *9* (20 per cent yeast) would be actually lower than that of Diet *1*. However, because of the metabolic interrelationships between cystine, methionine, and choline (7), the apparent primary deficiency of the sulphur amino acids is not tenable in these cases due to the inclusion of a relatively large quantity of choline in the diets.

Because these experiments were designed primarily for the purpose of improving human diets, the results of Mueller and Cox (8), which suggest that the requirements of the human being for the sulphur amino acids are lower than those of the rat, should be considered (9). On the other hand, the results of Bricker *et al.* (10), of Mitchell (11) and of Rose (12) suggest that the lysine intake is more important to the adult human being than to the adult rat. Mitchell (11) says, "The insignificant role that lysine plays in the protein anabolism of the adult rat contrasts sharply with the prominent place of lysine in the protein nutrition of adult man." Thus, one may conclude both from the chemical analyses and biologic feeding experiments that the addition of a relatively small quantity of a lysine-rich protein, such as milk, cheese, lactalbumin, liver, yeast, and so on, to the diets of the poorest groups in this country would result in an improvement in their protein nutrition to an extent greater than the actual amount of protein added, i.e., the proteins added would supplement the proteins of the basal food.

SUMMARY

Cystine or methionine were equivalent in improving the biologic value of milk proteins for young rats.

Rats on diets, the first deficiency of which was in the sulphur amino acids, showed no change in the cystine content of the proteins from the carcass, brain, or liver. There was a decrease in the cystine content of the hair which roughly corresponded to the decrease in the rate of growth of the experimental animals.

Experiments are reported which indicate the value of small additions of milk, cheese, lactalbumin, and other proteins containing relatively large quantities of lysine for improving the nutritive value of the average diets eaten by the poorest economic groups in the United States.

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Effect of Sulphite in Dehydrated Foods on Thiamine Content of a Diet[1]

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NUTRITIONAL problems which ordinarily come to mind in connection with the use of dehydrated foods are those concerned with palatability, attractiveness, stability, and other similar factors influencing the amount of food eaten. However, the amount of sulphite used as a preserving agent is not usually given as much consideration. For toxicologic reasons, maximum legal levels have been established for sulphite found in dehydrated foods (1–5); examples are given in Table 1.

TABLE 1

Legal levels for sulphite in dehydrated foods (1–5)

DEHYDRATED FOOD	AMOUNT OF SULPHITE	
	Not less than	Not more than
	p.p.m.	*p.p.m.*
Potatoes, diced or sliced	200	500
Cabbage	750	1500
Carrots	500	1000
Potatoes, riced or shredded		300
Peaches	2500	4000
Apricots	3000	4500

Several years ago it was found that the use of sulphurous acid as a preservative against bacterial decay of rice polish extracts led to a complete loss of its antineuritic activity. Williams and associates (6) found that crystalline thiamine dissolved in two parts of sodium sulphite solution at *p*H 1 and *p*H 4 and kept at room temperature for 36 hr. would lose about half its antineuritic activity at *p*H 1 and all its activity at *p*H 4. At *p*H 5, the reaction was completed after 24 to 48 hr. at room temperature; at steam bath temperature, within 1 hr.

It would seem unlikely, therefore, that sulphited foods would be a potent source of thiamine. However, the possibilities of destroying thiamine extend beyond the amount contained in the dehydrated food itself. A question arises concerning the effect upon the total thiamine content of a meal which contains the dehydrated type of food. It is not unreasonable to imagine that when such a meal is mixed in the acid medium of the stomach, some of the thiamine of the entire stomach contents might be destroyed. This possibility seemed real where military rations are concerned, because certain of the components are fortified by the addition of crystalline thiamine—the form of the vitamin which might be quite susceptible to destruction by sulphite. Such rations presumably adequate in thiamine might not be so in reality.

EXPERIMENTAL PROCEDURE AND RESULTS

The method first suggested for testing this possibility was to carry out comparative excretion studies in the presence and absence of dehydrated sulphited foods in the diet. Before doing this, however, it was deemed advisable to carry out preliminary laboratory studies to learn more of the degree of thiamine destruction that could be expected. Ultimately it was decided that the balance type of study was not necessary. The reasons for this decision will be apparent from the results presented below.

As a first step, model systems containing graded amounts of sodium sulphite (Na_2SO_3) were investigated in order to determine the effect of sulphite on the stability of thiamine buffered at *p*H 5.5. Solutions of 10, 30, 60 meg. per milliliter concentration were treated with 500 to 10,000 p.p.m. (parts per million) of sodium sulphite and then analyzed (7) both immediately and following 18 hr. of storage at 100°F. The only appreciable loss of thiamine occurred initially in those solutions containing 5,000, 6,000, and 10,000 p.p.m. However, after 18 hr. of storage at 100°F., the solutions had lost from 45 to 77 per cent of their original thiamine concentration in the

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presence of only 500 p.p.m.—the greatest loss occurring at the highest concentration of thiamine. In Table 2 are shown the overall results.

The next step was to determine what amount of sulphite would cause destruction of thiamine in an average meal which supplied approximately 0.7 mg. thiamine. Hamburgers, peaches, and crackers were

TABLE 2

Percentage retention of thiamine at pH 5.5 in the presence of sodium sulphite

CONCENTRATION OF SODIUM SULPHITE	THIAMINE RETENTION			
	0 storage time*	18 hr. storage time*	36 hr. storage time*	54 hr. storage time*
Thiamine Concentration: 10 mcg./ml.				
p.p.m.	%	%	%	%
None	100	98	100	101
500	98	47	56	45
1000	97	38	42	38
2500	91	26	18	
5000	90	8		
6000	85	0		
10,000	78	0		
Thiamine Concentration: 30 mcg./ml.				
None	100	106	101	100
500	102	55	35	27
1000	98	30	24	23
2500	92	1		
5000	88	0		
6000	83	0		
10,000	77	2		
Thiamine Concentration: 60 mcg./ml.				
None	100	100	99	
500	95	23	16	
1000	91	4		
2500	89	1		
5000	80	0		
6000	79	0		
10,000	80	1		

* At 100°F.

selected from the Army C ration for this experiment—the crackers being fortified with synthetic thiamine. A large sample was homogenized in a Waring Blendor, aliquots removed, and sulphite added from 0 to 30,000 p.p.m. per gram of equivalent dehydrated fruit.[2] Samples were then blended 15 min. under nitrogen before analysis for thiamine.

Figure 1 shows that the amount of sulphite necessary to cause complete destruction of the total thiamine was 30,000 p.p.m. However, there was between 15 and 35 per cent loss of thiamine in the presence of 4000 to 4500 p.p.m. of sulphite—the highest existing tolerance of sulphite in individual dehydrated foods. Sulphite present in 3000 p.p.m. concentration caused only a 15 per cent loss of thiamine.

It can be calculated that even if an individual sulphited fruit or vegetable contained 4500 p.p.m. (and most of these items have a legal maximum of considerably less than this), dilution by other foods would decrease the overall concentration so that little or no destruction of thiamine would be likely.

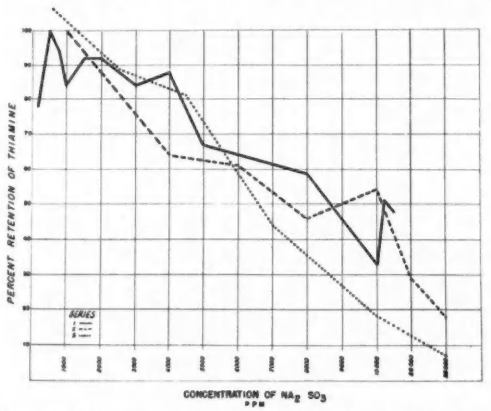

FIG. 1. *Percentage retention of thiamine in food in the presence of sodium sulphite.*

Furthermore, one of the effects of rehydration and cooking of dehydrated foods is to cause conversion of a considerable amount of sulphite to sulphate. The latter does not destroy thiamine (6). Thus it was concluded there will be no significantly deleterious effect on total thiamine intake arising from (sulphited) dehydrated fruits and vegetables.

SUMMARY

It is unlikely that the level of sulphite encountered in the usual ration or diet would be enough to cause nutritionally significant destruction of the total thiamine content of a meal.

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[2] The weight of canned peaches in the sample was converted to its equivalent weight of dehydrated fruit.

Comparison of Meat and Legumes in a Controlled Feeding Program

V. Second Study with Regimens Reversed—Results of Blood and Urine Tests and Functional Observations[1]

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IN THE previous part of this series of reports, children in two orphanages followed two dietary regimens of similar calculated caloric and nutritive values, with two respective levels of meat, as described (1). In Institution I a low-meat regimen was followed during the first fourteen months of the study; in Institution II a higher meat dietary was provided.

During a second fourteen-month period, the dietary regimens were reversed. A description of the dietaries and the findings concerning the physical status of the two groups during this phase of the study has been given in Part IV of this series (2).

This report covers the laboratory findings on blood and urine and the results of the functional observations.

FINDINGS

Blood Tests

Results of blood tests are shown in Table 1.

Marked differences in *hemoglobin* between the higher and low-meat groups were found during the first fourteen months, with the difference favorable to the former. When the dietaries were reversed, hemoglobin averages increased consistently in children of Institution I (the group then on the higher meat intake), and decreased in Institution II. During this period of reversed dietaries, the hemoglobin of children given meat ten times weekly (Institution I) rose from an average of 12.3 to 12.7 gm. per 100 cc. during the first seven months, and finally to an average of 13.4 gm. at the end of fourteen months. The average hemoglobin of the low-meat intake group, on the other hand, fell from 13.8 to 12.6 gm. per 100 cc. by the end of the first seven months; the final average at the close of the fourteen-month period was 12.9 gm.

In Figure 1 are shown the percentages of children below the Macy standard for hemoglobin (3) at each test period during the twenty-eight months of the study.

Red cell or *erythrocyte count* average values rose in both groups during the first fourteen months. Those below the level set by Macy (3) as representing nutritional anemia (4.5 million red cells per cubic millimeter blood) were greater at the end of the period in the low-meat group than in the higher meat group. During the second fourteen-month study, the red cell count averages increased consistently in the higher meat group and decreased in the lower. Moreover, the percentage of children with counts sufficiently low to class them as exhibiting nutritional anemia decreased in the higher meat and increased in the lower meat group.

In Figure 2 are shown the percentage of children with 4.5 million red cells per cubic millimeter and below at each test period throughout both phases of the study.

Hematocrit values were not low at any test period in any group, assuming the 40 per cent packed volume level suggested by Macy (3) to be the standard.

Values for two factors were calculated from the hemoglobin, erythrocyte count, and hematocrit. These were the *mean hemoglobin content per cell* and the *hemoglobin concentration*, the formulas for which are shown in Table 1. During the first fourteen months, the percentage of children below a defined standard for each of these values decreased in both groups, but considerably more sharply in the higher meat intake group.

[1] This paper is one of a series of reports on nutrition studies of institutionalized children conducted by the Ellen H. Richards Institute under the auspices of the Department of Health, Commonwealth of Pennsylvania. The study was assisted by a grant-in-aid from the National Live Stock and Meat Board. Received for publication April 4, 1949.

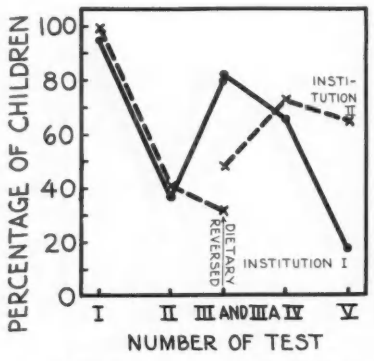
TABLE 1

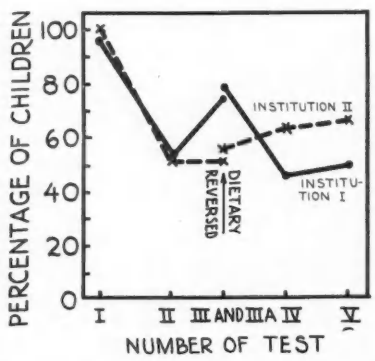
Summary of blood and urinary tests

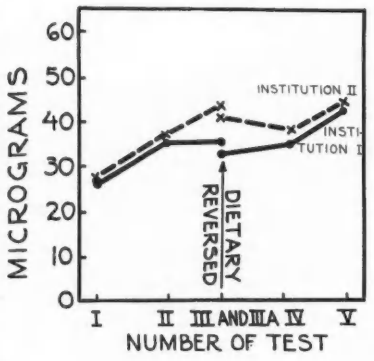
BLOOD AND URINARY TESTS	INSTITUTION I (Meat 10 times weekly)			INSTITUTION II (Meat 2 times weekly)		
	Test IIIA	Test IV	Test V	Test IIIA	Test IV	Test V
HEMOGLOBIN						
Average gm./100 cc. blood	12.3	12.7	13.4	13.8	12.6	12.9
Range; percentage of children with hemoglobin values of						
13.00 gm./100 cc. blood and above (Class 1)	19.4	34.6	82.1	52.5	27.5	35.0
12.99 to 11.50 gm./100 cc. blood (Class 2)	68.9	65.4	17.9	47.5	72.5	55.0
11.49 to 10.00 gm./100 cc. blood (Class 3)	11.7	0.0	0.0	0.0	0.0	10.0
9.99 to 8.50 gm./100 cc. blood (Class 4)	0.0	0.0	0.0	0.0	0.0	0.0
Below 8.50 gm./100 cc. blood (Class 5)	0.0	0.0	0.0	0.0	0.0	0.0
ERYTHROCYTE COUNT						
Average millions of red cells/cu.mm. blood	4.31	4.48	4.40	4.48	4.44	4.30
Range; percentage of children with erythrocyte counts of						
4.76 million/cu.mm. blood and over (Class 1)	3.8	12.8	14.1	12.5	5.0	2.5
4.75 to 4.51 million/cu.mm. blood (Class 2)	16.7	39.7	23.1	32.5	32.5	32.5
4.50 to 4.26 million/cu.mm. blood (Class 3)	41.0	32.1	41.0	40.0	42.5	10.0
4.25 to 4.01 million/cu.mm. blood (Class 4)	28.2	9.0	14.1	7.5	17.5	42.5
4.00 million/cu.mm. blood and below (Class 5)	10.3	6.4	7.7	7.5	2.5	12.5
Percentage of children in Classes 3, 4, and 5 (4.5 million/cu.mm. and below)	79.5	47.5	52.8	55.0	62.5	64.0
Percentage of children in Classes 4 and 5 (4.25 million/cu.mm. and below)	38.5	15.4	21.8	15.0	20.0	55.0
HEMATOCRIT (packed cell volume)						
Average percentage	37.2	37.8	37.4	37.6	37.9	37.3
Range; percentage of children with hematocrit of						
40 per cent and above (Class 1)	7.8	21.8	20.5	7.5	10.0	17.5
39 to 37 per cent (Class 2)	64.9	50.0	46.2	70.0	75.0	42.5
36 to 34 per cent (Class 3)	26.0	28.2	25.6	22.5	15.0	35.0
33 to 31 per cent (Class 4)	1.3	0.0	5.4	0.0	0.0	5.0
30 per cent and below (Class 5)	0.0	0.0	1.3	0.0	0.0	0.0
MEAN HEMOGLOBIN CONTENT PER CELL [(Hemoglobin × 10)/red cell count]; percentage of children below $\frac{13 \times 10}{4.76}$	14.3	5.2	0.0	2.5	5.0	2.5
HEMOGLOBIN CONCENTRATION [(Hemoglobin × 100)/hematocrit]; percentage of children below $\frac{13 \times 100}{40}$	26.9	16.7	1.3	10.0	12.5	5.0
LEUCOCYTE COUNT; average/cu.mm. blood	6800	7400	7600	6600	7800	7300
DIFFERENTIAL CELL COUNT						
Average percentage of						
Polymorphonuclear type	56.7	55.6	55.0	58.4	52.8	51.9
Lymphocyte type	41.0	41.5	42.4	39.6	44.1	45.5
Monocyte type	0.7	1.9	2.0	1.0	2.3	2.1
Eosinophil type	1.3	0.5	0.2	0.8	0.2	0.1
Basophil type	0.3	0.5	0.4	0.2	0.0	0.4
BLOOD PLASMA VITAMIN A						
Average mcg./100 cc. plasma	32.8	33.3	40.8	40.9	36.7	42.6
Range; percentage of children with vitamin A values						
Above 35.5 mcg./100 cc. plasma (Class 1)	39.2	26.7	67.5	70.0	37.5	75.0
35.5 to 29.51 mcg./100 cc. plasma (Class 2)	19.3	37.3	23.4	17.5	32.5	20.0
29.5 to 23.51 mcg./100 cc. plasma (Class 3)	20.8	16.7	9.1	7.5	15.0	5.0
23.5 to 17.51 mcg./100 cc. plasma (Class 4)	15.5	16.7	0.0	5.1	15.0	0.0
17.5 mcg./100 cc. plasma and below (Class 5)	5.2	2.6	0.0	0.0	0.0	0.0
BLOOD PLASMA CAROTENE						
Average mg./100 cc. plasma	0.17	0.14	0.15	0.15	0.12	0.14
Range; percentage of children with carotene values of						
0.20 mg./100 cc. plasma and above (Class 1)	23.0	7.7	10.3	12.8	0.0	15.0
0.19 to 0.15 mg./100 cc. plasma (Class 2)	43.6	26.9	33.3	33.3	12.5	37.5
0.14 to 0.10 mg./100 cc. plasma (Class 3)	30.8	48.7	47.4	46.3	72.5	47.5
0.09 to 0.05 mg./100 cc. plasma (Class 4)	1.3	16.7	9.0	7.6	15.0	0.0
Below 0.05 mg./100 cc. plasma (Class 5)	1.3	0.0	0.0	0.0	0.0	0.0

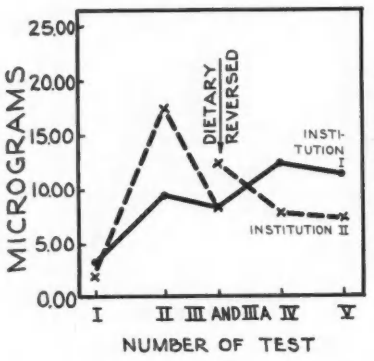
TABLE 1—*Concluded*

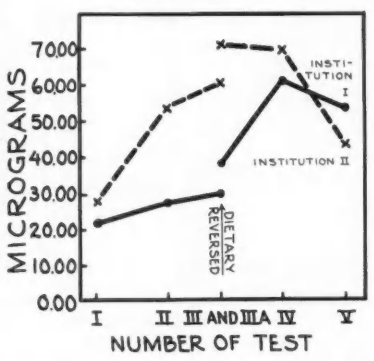
BLOOD AND URINARY TESTS	INSTITUTION I (Meat 10 times weekly)			INSTITUTION II (Meat 2 times weekly)		
	Test IIIA	Test IV	Test V	Test IIIA	Test IV	Test V
BLOOD PLASMA ASCORBIC ACID						
Average mg./100 cc. plasma	1.33	1.30	1.19	1.26	1.35	1.14
Range; percentage of children with ascorbic acid values of						
1.10 mg./100 cc. plasma and above (Class 1)	71.8	57.7	62.8	71.8	77.5	52.5
1.09 to 0.90 mg./100 cc. plasma (Class 2)	19.2	21.9	20.5	17.9	17.5	22.5
0.89 to 0.70 mg./100 cc. plasma (Class 3)	7.7	8.9	11.5	10.3	2.5	17.5
0.69 to 0.51 mg./100 cc. plasma (Class 4)	1.3	8.9	5.2	0.0	2.5	17.5
0.50 mg./100 cc. plasma and below (Class 5)	0.0	2.6	0.0	0.0	0.0	7.5
BLOOD SERUM TOTAL PROTEIN						
Average gm./100 cc. serum	6.79	6.52	6.84	6.77	6.32	6.78
Range; percentage of children with total protein values of						
7 gm./100 cc. serum and over (Class 1)	35.9	19.2	20.5	22.5	10.0	37.5
6.99 to 6 gm./100 cc. serum (Class 2)	64.1	80.8	66.7	77.5	70.0	62.5
5.99 to 5 gm./100 cc. serum (Class 3)	0.0	0.0	12.8	0.0	20.0	1.0
4.99 to 4 gm./100 cc. serum (Class 4)	0.0	0.0	0.0	0.0	0.0	0.0
Below 4 gm./100 cc. plasma (Class 5)	0.0	0.0	0.0	0.0	0.0	0.0
Percentage of children in Classes, 3, 4, and 5 (5.99 gm./100 cc. serum and below)	0.0	0.0	12.8	0.0	20.0	0.0
BLOOD SERUM ALBUMIN						
Average gm./100 cc. serum	4.90	4.50	5.02	4.84	4.17	4.49
Range; percentage of children with serum albumin values of						
5 gm./100 cc. serum and above (Class 1)	37.2	10.0	38.5	20.0	0.0	0.0
4.99 to 4 gm./100 cc. serum (Class 2)	62.8	87.4	61.5	80.0	72.5	100.0
3.99 to 3 gm./100 cc. serum (Class 3)	0.0	2.6	0.0	0.0	27.5	0.0
2.99 to 2 gm./100 cc. serum (Class 4)	0.0	0.0	0.0	0.0	0.0	0.0
Below 2 gm./100 cc. serum (Class 5)	0.0	0.0	0.0	0.0	0.0	0.0
Percentage of children in Classes 3, 4, and 5 (3.99 gm./100 cc. serum and below)	0.0	2.6	0.0	0.0	0.0	0.0
BLOOD SERUM GLOBULIN						
Average gm./100 cc. serum	1.93	1.96	1.94	1.99	2.16	2.35
Range; percentage of children with globulin values below						
1.5 gm./100 cc. serum	16.7	10.3	7.7	12.5	5.0	5.0
1.4 gm./100 cc. serum	8.9	5.1	5.1	5.0	2.5	2.5
1.3 gm./100 cc. serum	3.8	3.8	2.6	2.5	2.5	2.5
1.2 gm./100 cc. serum	2.6	1.3	0.0	0.0	2.5	0.0
ALBUMIN-GLOBULIN (A/G) RATIO						
Range; percentage of children with ratio						
Approximately 2.5:1	20.5	25.6	30.7	27.5	17.5	2.5
Below 2.5:1	37.2	37.7	26.9	22.5	72.5	95.0
BLOOD PHOSPHATASE						
Average in King-Armstrong units	9.80	11.63	10.55	11.0	10.9	10.2
Percentage of children with excessive blood phosphatase units (20 K-A units and above)	0.0	0.0	0.0	2.6	0.0	0.0
URINARY THIAMINE						
Average mcg./1 hr. fasting sample	9.2	13.0	10.6	10.7	7.9	7.5
Range; percentage of children with thiamine values of						
6.0 mcg. and above (Class 1)	77.3	91.0	53.8	87.2	92.1	62.5
4.5 to 5.99 mcg. (Class 2)	13.3	5.1	26.9	7.7	7.9	30.0
3.0 to 4.49 mcg. (Class 3)	4.0	2.6	14.1	5.1	0.0	5.0
1.5 to 2.99 mcg. (Class 4)	2.6	1.3	3.8	0.0	0.0	2.5
1.49 mcg. and below (Class 5)	2.6	0.0	1.3	0.0	0.0	0.0
URINARY RIBOFLAVIN						
Average mcg./1 hr. fasting sample	38.9	62.0	54.4	71.8	70.0	43.9
Range; percentage of children with riboflavin values of						
60.0 mcg. and above (Class 1)	11.5	42.3	32.1	51.4	47.3	12.5
59.99 to 45.00 mcg. (Class 2)	12.8	26.9	42.3	17.9	23.6	40.0
44.99 to 30.00 mcg. (Class 3)	0.0	12.8	14.1	17.9	18.6	27.5
29.99 to 15.00 mcg. (Class 4)	0.0	15.4	8.9	12.8	10.5	20.0
Below 15.00 mcg. (Class 5)	0.0	2.6	2.6	0.0	0.0	0.0











Above, left to right:

FIG. 1. *Percentage of children below the Macy standard for hemoglobin.*

FIG. 2. *Percentage of children with 4.5 million red cells/cu.mm. and below.*

FIG. 3. *Average vitamin A blood plasma values of both groups of children.*

At right:

FIG. 4. *Average thiamine excretion of children (1 hr. fasting sample).*

FIG. 5. *Average riboflavin excretion of children (1 hr. fasting sample).*

During the second period, still fewer children were below the standard for these calculated values, a somewhat greater drop in the number of children who were sub-standard occurring in the higher than in the low-meat group.

Leucocyte counts and *differential cell counts* were within the normal limits throughout the study.

Blood plasma vitamin A values increased to some extent in the low-meat group during the first fourteen-month period, but to a markedly greater degree in the higher meat intake group. The increase in children with high blood plasma vitamin A levels also increased in both groups, but the increase was more marked in those on the higher meat and liver program.

During the second phase of the study, Institution I (now on the higher meat intake) increased notably in blood plasma vitamin A averages as well as in the percentage of those with high blood plasma vitamin A. The low-meat group (Institution II) fell somewhat in this respect between Test IIIA and Test IV but had returned approximately to the Test IIIA level at the time of the last test. In short, when Institution I was on a low-meat and liver intake, blood vitamin A levels rose somewhat, presumably because the new dietary was better in many respects, including a high intake of greens, than before the investigation began. Then, when the higher meat regimen was instituted, the vitamin A blood plasma values rose more markedly through the second fourteen months.

In Institution II, the values rose sharply during the first fourteen months on the higher meat intake and approximately maintained the *status quo* during the second period when there was a low intake of meat.

The rise of blood plasma vitamin A values from a low to a higher level has been found in the Pennsylvania mass nutrition studies and in the work of other investigators to take place over a matter of a few months, although a high value—once established—is retained for a considerable period of time.

In Figure 3 are seen the average blood plasma vitamin A values at each test period throughout the two fourteen-month parts of this study.

Carotene values in the blood plasma showed no remarkable changes or differences between groups during this period of the investigation.

A slight decrease in *ascorbic acid* levels was consistent in both groups with the dietary decrease in this nutrient.

Total protein blood serum values were not strikingly different in the two institutions, although the final averages were slightly higher at the end of each period for the higher meat group.

At the end of the first fourteen-month period the *blood serum albumin* values were somewhat better for the group on higher meat intake. At the end of the second period, the average serum albumin value of the higher meat group was markedly greater.

During the first half of the study, the average values for *serum globulin* increased for the low-meat-

high-vegetable protein group and decreased for the higher meat intake group. During the second, the average values for the higher meat group remained stationary while those for the group receiving less meat and more vegetable protein markedly increased.

The increase in albumin in proportion to globulin in the higher meat group, and the reverse in the low-meat group (both with equivalent amounts of dietary protein from different sources) has led in both phases of the study to an increase in the percentage of children in the higher meat group in each period meeting the optimum *albumin-globulin* (A/G) *ratio* of Peters and Eisenman (4); this ratio is 2.5:1. A concurrent decrease in the percentage of subjects meeting this ratio was found in both periods in the low-meat-high-vegetable protein group.

Phosphatase values were good throughout the second fourteen-month period in both groups.

Urinary Tests

Averages for *urinary thiamine* and *riboflavin* excretion consistently increased in Institution I (higher meat), and decreased in Institution II during this second period (Table 1). The change was the more marked in both groups for the riboflavin.

Average 1-hr. excretion values for thiamine are shown in Figure 4; for riboflavin in Figure 5.

Functional Tests and Observations

In Table 2 are given the functional values as judged by the pediatrician, or as measured.

The percentage of children exhibiting *sluggish* or *hyper-active reflexes* was greater in the low-meat than in the higher meat group during the period covered by this report. This is consistent with the findings during the first fourteen-month period.

The pediatrician's ratings for *absence of fatigue* became more favorable for both groups as the study proceeded, but was better for the higher meat group both at the seven- and fourteen-month test period.

In the standard *push-up test* described by Neilson and Cozens (5), only boys were tested because the standards apply only to boys. As in the tests during the first period, the higher meat group surpassed the others; this was true both of the final average score and of the advance made from Test IIIA to Test V.

In *dark adaptation*, the higher meat group in both periods consistently showed improvement in test responses, with the group on the low-meat intake decreasing in their ratings.

TABLE 2

Summary of functional observations

CONDITION	INSTITUTION I (Meat 10 times weekly)			INSTITUTION II (Meat 2 times weekly)		
	Test IIIA	Test IV	Test V	Test IIIA	Test IV	Test V
REFLEXES; percentage of children exhibiting						
Sluggish reflexes	28.5	23.0	10.3	0.0	42.5	22.5
Hyper-active reflexes	16.6	6.4	5.1	0.0	2.5	17.5
FATIGUE						
Absence of; average score*	2.7	3.8	4.3	2.7	2.7	3.4
Push-up test; average score (males only)	25.2	X	52.7	33.8	X	48.3
DARK ADAPTATION; average class following bright light exposure†	2.9	2.5	2.4	2.2	2.4	2.8

* Perfect score was five points.

† Class 1 is the highest score.

DISCUSSION

In Part III of this series of reports (1), a full discussion of the findings of the first fourteen months of the investigation and a comparison of the results with those of other investigators in the animal and human nutrition field were cited. The work covered by this report confirms and elaborates the findings of the former period of study.

In the intervening time between the publication of Parts I to III and the present series of the reports, the works of several investigators have been published which bear on this study. Thus Leverton (6) has found that meat fed to human infants improved levels of hemoglobin and red cell count. The work is not entirely comparable in that it did not involve a comparison of the two sources of protein in basic dietaries for older children as has been made in the current study.

Rickes and co-workers (7) have reported the isolation from liver of a crystalline compound, vitamin B_{12}, related to pteroylglutamic acid, which is extremely effective in the treatment of pernicious anemia, and which may be related to the better hematological and growth values in the children with higher intake of liver.

Smith and co-workers (8) have studied the effect of B vitamins, liver, and yeast on the growth of rats and have reported the probability of a factor other than the known B vitamins related to growth.

These give new possibilities for explaining the more favorable findings in the groups on higher meat and liver intakes as compared to those on high-legume intakes.

SUMMARY

The findings on blood, urine, and functional tests and observations when the regimens providing for two respective levels of meat intake were reversed in two cooperating children's institutions, are reported. The children with the higher meat intakes surpassed those on the low-meat intake in these respects: hemoglobin levels; erythrocyte counts; absence of nutritional anemia; blood plasma vitamin A; serum albumin; favorable albumin-globulin ratios; urinary thiamine and riboflavin excretion values; reflexes; absence of fatigue; and dark adaptation. This confirms earlier findings in a cited study.

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Raisins from California

Raisins, which we take for granted today, had a rather spectacular history. In biblical days, King David's subjects were said to have presented raisins as a major part of the barter with which they paid their taxes. Since then, the raisin business has shifted first from what was then Armenia to Asia Minor and then on to Spain and Hungary. For centuries, Spain, the Near East, and Greece furnished the world its supply of raisins.

But in 1878 domestic raisins from California were introduced to Americans and by 1892 the California crop, superior in every way to imports, was 30,000 tons. This tonnage was ample to displace Spain as the leader in production. For many years now, raisin production in California has averaged 200,000 tons annually, approximately half going for domestic consumption, the rest being used for export.

There are two primary varieties of raisins: Muscats and Thompson seedless. Muscats are large-sized raisins which have been mechanically seeded. Thompson's are named in honor of the man who brought the first cuttings of seedless grapes to California. There are two kinds of Thompson's: the "natural" and "golden bleached." The "natural" is the most popular because it can be used for innumerable purposes. The "golden bleached" variety is a novelty, with its name aptly describing its color. It is highly prized during the holidays for use in white fruit cakes and steamed puddings.

Processing of Raisins

After grapes have fully ripened, they are hand-picked, laid on trays and allowed to dry, first in the sun and then in the shade. The fruit requires turning every now and then to insure even drying. Before being taken to packing houses, the raisins are placed in "sweat boxes" to equalize the moisture content.

Raisins are packaged only when there is an order to be filled, contrary to general belief that the entire crop is packaged after harvest. When there is an order for Thompson raisins, the tiny "cap" stems are removed by fine mesh screens, and the raisins are then graded, thoroughly cleaned, poured into containers, and weighed. The entire packing and packaging is done by machinery. Muscats are processed slightly differently but on the same principle; they are seeded mechanically and then packed similarly to the seedless raisins.

Rigid inspection, sanitary control, and grading are standards maintained throughout the raisin industry. Unless raisins are carefully inspected, they might easily deteriorate, and the industry takes every precaution to avoid such occurrences.

Cooking Raisins

The degree of concentration of raisins accounts for many of their desirable qualities. It requires 4 lb. fresh grapes to make 1 lb. raisins. In cooking, the volume increases to compensate in part for the 24 per cent of the moisture which has been removed in drying. A pound of raisins when cooked weighs 2 lb. and provides nine servings of ¾ cup fruit plus juice.

After considerable research, it has been determined that the best way to cook raisins is to boil them vigorously for 10 min., allowing a cup of water and ½ Tbsp. sugar for each cup of raisins. The rapid cooking makes the fruit plump and tender.

The nutritive values of raisins may be summed up concisely: They contain carotene, thiamine, riboflavin, calcium, magnesium, potassium, and sodium, and they are rich in iron and copper.—*Ilma Lucas Dolan, Dietitian, California Foods Research Institute, San Francisco.*

Retention of B Vitamins after Large-Scale Cooking of Meat

II. Roasting by Two Methods[1]

SYLVIA COVER, ESTHER M. DILSAVER, RENE M. HAYS, and W. H. SMITH

Texas Agricultural Experiment Station, College Station, Texas

WHEN meat is roasted in the home, only one roast is placed in the pan. In quantity cookery, a pan approximately as wide and long as the oven is filled with a number of roasts. These roasts may or may not be similar in size.

Cooperative Meat Investigations, after extensive research by the members of its Committee on Preparation Factors (1), recommended that meat be roasted at constant low oven temperatures of 149 to 177°C. (300 to 350°F.), with 149°C. (300°F.) preferable in most cases. However, this requires considerable cooking time. When meat is roasted in large quantities, there is a great temptation to use high oven temperatures to decrease the cooking time. The authors have observed oven temperatures as high as 205°C. (450°F.) as routine procedure in some Army messes and college dining halls.

Meat is considered well-done when it is gray in color throughout. This occurs when the internal temperature reaches 80°C. (176°F.) for beef and 84°C. (183°F.) for pork. Meat, however, is sometimes cooked until it falls apart when lifted from the pan. Some cooks are inclined to regard this as a test of tender and well-done meat when actually the meat is overdone and stringy. Internal meat temperatures taken under these conditions have been as high as 98°C. (209°F.).

That oven and meat temperatures have a pronounced influence on the amount a piece of meat will shrink during cooking has been shown by Alexander (2), Alexander and Clark (3), and Cline *et al.* (4). Since this shrinkage is caused largely by loss of water, the water-soluble vitamins (thiamine, pantothenic acid, niacin, and riboflavin) may be carried out of the meat with the juices.

The present study was made to obtain information on the retention of thiamine, pantothenic acid, niacin, and riboflavin after roasting in large quantities under the recommended low temperature conditions and to compare this retention with that obtained when high oven and high meat temperatures were used.

[1] Received for publication September 7, 1948.

EXPERIMENTAL PROCEDURES

The selection of cuts for roasting was given careful consideration. Boneless cuts from the round and rib of beef and from the loin and ham of pork may be made by cutting along the natural divisions of the muscles. Such cuts have been prepared commercially and are suitable for quantity cookery because of the ease in slicing. They also present fewer difficulties in retention studies than cuts in which the bone has not been removed.

The one-muscle roasts used in this study were: longissimus dorsi (eye of rib), semi-membra-nosus (inside or top round), biceps femoris (outside or bottom round) of both beef and pork; and semi-tendinosus (eye of round) for beef only. It has been shown by Cover, Dilsaver, and Hays (5) that when the rights and lefts from the same carcasses are used, these one-muscle roasts may be used with confidence for retention studies.

For the low-temperature studies the procedure was as follows: The one-muscle roasts from one side of the carcass were analyzed raw. Their pair mates from the other side of the carcass were placed together in a pan, which was approximately the size of the oven. The roasts filled the pan. The meat was not salted, nor floured, nor was water added. The low-temperature cooking took place in a preheated oven held at 150°C. (302°F.). As soon as a roast reached an internal temperature of 80°C. (176°F.) for beef, or 84°C. (183°F.) for pork, that roast was removed. This was continued until all had been removed. Removing the smaller roasts as they become done and returning the larger ones for longer cooking is customary in large-scale cookery. With this method of roasting, usable drippings were obtained. Analyses for thiamine, pantothenic acid,

niacin, and riboflavin were made on the individual roasts and the drippings according to the procedures previously described by Cover *et al.* (6).

Retention studies were also carried out with roasts from other carcasses cooked in a high temperature oven and to a high internal temperature. In this case the oven temperature was 205°C. (450°F.) and the internal temperature of the meat reached 98°C. (209°F.). In other respects the procedures were as described above. However, by the time the last roast was removed, the drippings in the pan had burned so that they were not usable.

All retentions were calculated on the basis of the total vitamin content of the entire pan of meat before and after cooking. Retentions were reported on the basis of the meat alone, drippings alone, and on the total of meat plus drippings.

Data are reported on a total of 48 beef roasts and 36 pork roasts. These roasts were obtained from 12 beef carcasses and 12 pork carcasses.

Retention

Total Retentions. In beef, total retentions of 93, 92, and 91 per cent for pantothenic acid, niacin, and riboflavin, respectively, indicated practically complete retention when the low temperatures were used in large-scale cookery (Table 1). However, total retentions of 60, 71, and 68 per cent respectively for these same vitamins indicated considerable loss when the high temperatures were used. With thiamine, a total retention of 67 per cent even with the low temperatures indicated considerable loss but a still greater loss was indicated by the 47 per cent retention when the high temperatures were used (Table 1).

The data for these roasts were subjected to an analysis of variance. The difference between the two methods of cooking was found to be highly significant for all four of the vitamins when total retention in beef was considered.

In pork, total retention of 90, 95, and 92 per cent for pantothenic acid, niacin, and riboflavin indicated little if any loss of these vitamins at the low temperatures (Table 1). Values of 63, 67, and 69 per cent respectively for the high temperatures indicated considerable loss, however. For thiamine, the retentions were 81 versus 54 per cent for the low and high temperatures, respectively. Statistical analyses showed that the difference between the two methods was highly significant for all four vitamins in pork on the basis of total retention.

Retention in Meat. The total retentions as given above included the usable drippings. Since the drippings from the high-temperature method were not usable, the low- and high-temperature methods were next compared on the basis of retention in the meat alone. On this basis, retentions with the low temperatures were still somewhat greater than with the high temperatures (Table 1). Statistical analyses showed that the meat of beef roasts retained significantly more thiamine, pantothenic acid, and riboflavin when it was cooked at low temperatures than at high temperatures. Thiamine, however, was the only one of these four vitamins which was retained in significantly greater quantities in the meat of pork roasts cooked at the low temperatures.

Retention in Drippings. It should be emphasized that a considerable proportion of these four vitamins appeared in the drippings (Table 1). If the cooking temperature was high enough to make them unusable, this portion of the nutritive value of the meat was lost. The same would be true, however, if the drippings from the low-temperature cooking were discarded.

Vitamin Content

The average vitamin contents of the raw meat are given according to muscle (Table 2). The pork used in these tests was considerably higher in thiamine and pantothenic acid than the beef. Of the vitamins for which recommendations have been set up, thiamine in pork and niacin in both pork and beef were present in quantities large enough to be considered as making an important contribution to the daily allowances.

Destruction of a vitamin during cooking can be of

TABLE 1

Vitamin retention in beef and pork after roasting at high and low temperatures

DESCRIPTION OF SAMPLE	THIAMINE RETENTION			PANTOTHENIC ACID RETENTION			NIACIN RETENTION			RIBOFLAVIN RETENTION		
	Meat only	Drippings	Total	Meat only	Drippings	Total	Meat only	Drippings	Total	Meat only	Drippings	Total
	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan	%/pan
Low oven temperature												
Beef	61	6	67	73	20	93	76	16	92	75	16	91
Pork	64	17	81	65	25	90	69	26	95	73	19	92
High oven temperature*												
Beef	47			60			71			68		
Pork	54			63			67			69		

* Drippings from roasts cooked at high oven temperatures were charred and unusable.

TABLE 2

Average vitamin content of raw beef and pork roasts

DESCRIPTION OF SAMPLE	THIAMINE	PANTOTHENIC ACID	NIACIN	RIBOFLAVIN
	mcg./gm.	*mcg./gm.*	*mcg./gm.*	*mcg./gm.*
Semi-membra-nosus muscle				
Beef	1.86	2.58	52.0	1.74
Pork	11.49	7.02	46.5	1.72
Biceps femoris muscle				
Beef	1.82	3.08	47.9	1.91
Pork	9.64	6.76	36.2	1.70
Longissimus dorsi muscle				
Beef	1.46	1.92	49.2	1.49
Pork	9.96	5.83	43.6	1.34
Semi-tendi-nosus muscle				
Beef	1.59	2.02	44.3	1.53

practical importance only when a statistically significant amount has been destroyed and when a serving (4 oz. on the raw basis) contains a sizable share of the daily allowance. These two conditions were met only for thiamine in pork and niacin in pork and beef. Such a serving of pork, with its gravy, if cooked with low temperatures may supply 60 per cent of the thiamine recommended daily but only 40 per cent if cooked at high temperatures. Similarly for niacin, a serving of pork may supply 31 per cent versus 22 per cent, and a serving of beef 34 per cent versus 27 per cent of the daily allowance if cooked with low and high temperatures respectively.

Thus, the saving in the thiamine content of pork roasted with the low temperatures was not only statistically significant but of importance in practical nutrition as well. The saving in niacin, from using low rather than high temperatures, may also be of practical importance for both pork and beef. For riboflavin in pork and thiamine and riboflavin in beef, no savings of value in practical nutrition occurred. No recommendations have been made for pantothenic acid, and the effect of temperature on this vitamin cannot be given in regard to practical nutrition.

Losses in Weight During Cooking

The losses in weight of the roasts cooked at the two temperatures are given (Table 3). For both beef and pork the greater loss in weight with the high temperatures was highly significant. Thus less meat was left for serving when it was cooked at the high temperatures.

CONCLUSIONS

Total retentions, which include both meat and drippings, were significantly higher for thiamine, pantothenic acid, niacin, and riboflavin for both beef and pork when roasting was done with the low, rather than the high temperatures.

TABLE 3

Weight losses in meat during roasting

LOW OVEN AND MEAT TEMPERATURES		HIGH OVEN AND MEAT TEMPERATURES	
Carcass number	Loss in weight per pan of meat	Carcass number	Loss in weight per pan of meat
Beef			
	%		%
5	23	7	35
6	27	9	40
8	23	10	38
11	33	12	44
13	28	14	39
15	30	16	41
Mean.....	27	Mean.....	40
Pork			
8	30	9	39
11	35	10	43
12	30	13	43
14	29	15	41
16	31	17	37
18	32	19	37
Mean.....	31	Mean.....	40

Retentions, based on meat only, were significantly higher with the low temperatures for thiamine, pantothenic acid, and riboflavin in beef and for thiamine in pork.

The saving in total vitamin value by roasting with low rather than high temperatures was of practical value only for thiamine and for niacin in pork and possibly for niacin in beef.

Losses in weight during cooking were greater with the high temperatures, so that more meat was left for serving when it was cooked with the low temperatures.

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ELIZABETH PERRY
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Editorial

ELIZABETH PERRY, PRESIDENT OF THE AMERICAN DIETETIC ASSOCIATION

Elizabeth Perry brings to the office of presidency of the American Dietetic Association in 1949–50 the personality characteristics and demonstrated performance of a fine administrator. Years of experience in the many activities of the Association make her superbly prepared to carry the leadership with intelligence and understanding.

Confidence and respect for any leader comes from a knowledge of personal attributes and from the record of activities and accomplishments, all of which forecast the quality of future performance. With the world-wide awakening to the importance of food and the increased realization of the value of food in health, happiness, and security, the one organization in this country devoted solely to nutrition and its practical application, the American Dietetic Association, carries a major responsibility. The presidency is not only an honor but a call to duty, for although many members participate and help carry full shares of work, the President must shoulder the greatest load.

Pioneering for better ways of living and helping others is the family background of Elizabeth Perry, who carries on the family tradition in her enthusiastic performance as a dietitian and leader in her profession. The incoming President's maternal family were early settlers in New York State, then migrated to Illinois, and later pioneered in Kansas. Her father's people went from Ohio and Wisconsin to Kansas, taking with them the first pure-bred Hereford cattle in that state. Elizabeth was born near Pleasanton, Kansas, also her father's birthplace. Forward looking, hard working, generous, and stable people were the family whose descendant has been chosen the leader of the American Dietetic Association for 1949–50. The imprint of these characteristics is borne by Elizabeth Perry, with a guarantee of the continued fine leadership which she has developed by being willing to work for her profession generously and without claim for credit.

Her family life developed in Elizabeth an acceptance and eagerness to carry her responsibility as a leader or as part of a team. Stability, generosity, kindness, and tolerance are evident characteristics of the Perry home. The rural life and schooling seem to have brought forth a zest for living and the ability to maintain a fine balance between work and play. From the sincere and friendly attitudes in the family and in the small town life grew Elizabeth's ability to make and keep a host of loyal friends in all walks of life.

Elizabeth Perry graduated from Kansas State College in 1925 and, following her decision made in the eighth grade to become a dietitian, she completed her dietetic internship at Buffalo City Hospital, Buffalo, New York. She remained on the staff there until she came to Cleveland in 1927 to become a Manager of Russett Cafeteria. Here she acquired experience in producing food of high standard in the field of commercial competition. In 1930, she went to Cunningham Sanatorium as Chief Dietitian for two years and then moved on to direct the Dietary Department at Cleveland City Hospital. Here she has maintained leadership and gained recognition throughout changing political and administrative regimes. In fact, she is now part of the administration of the hospital and has the unique position of Assistant Superintendent and Chief Dietitian, City Hospital of Cleveland.

The incoming President has had unusually good preparation for the post of leadership of the American Dietetic Association because of her long and thorough acquaintance and participation in local, state, and national committees and offices. In each she has demonstrated interest, ability, and willingness to work for the profession in many capacities. She has served as President of both state and local associations and as chairman of committees of the national Association. She has been a delegate from Ohio since 1940 and was Chairman of the House of Delegates and Vice-President of the American Dietetic Association from 1942 to 1944.

She helped lay the groundwork for the Public Relations Committee of the American Dietetic Association, serving as Co-Chairman one year and Chairman the next year. Participation in several projects of the Food Administration Section in the state association and committee membership on the national basis has made the incoming president aware of the value of professional activities both as members and as contributors to the dietetic and allied professions. Knowledge of the organization, responsibilities, and management of the American Dietetic Association has been enhanced through her work as a

member of the Constitution Revision Committee in 1943–44, as Chairman of the Reorganization Committee in 1947–48, and as a member of the Constitution Revision Committee this last year.

Along with all of these direct contributions to the dietetic profession, Miss Perry has participated in the activities of other organizations in Cleveland, thereby carrying the reputation of dietetics, its value and contributions to members of allied professions and the public. She was President of the Cleveland Home Economics Association from 1945 to 1947 and in this capacity she acted as Chairman of the Local Arrangements Committee of the American Home Economics Association Convention in 1946. In this office, she not only demonstrated the abilities of a fine administrative dietitian, but also learned how another organization carries on its important business of a national convention. Many friends were made among home economists and those who specialized in dietetics which makes for mutual understanding of related professions.

Extending dietetics into the community is profitable to the individual and to her profession, and with this realization Elizabeth Perry participates in several groups. She has been Chairman of the Dietary Committee of the Cleveland Hospital Council since 1946. As a member of the Cuyahoga County Nutrition Committee and the Dietitian Aide Committee of the American Red Cross, she has helped to promote better understanding of the value of the dietitian to the health and well-being of many people. Furthermore, she maintains contact with the Kansas State College alumni and with Delta Delta Delta sorority, and these people are proud and interested that one of their own has achieved and been recognized in her profession. A wider scope of friends resulted when she was elected to Zonta in 1946, and she has since served as Recording Secretary and as an Executive Board member for this organization. All this, according to expert opinion, is a part of Miss Perry's own public relations program.

The non-professional attributes and interests of an individual may have extraodinary and favorable influence on the professional. Elizabeth Perry likes to have fun; she enjoys and is enjoyed in the few hours devoted to relaxation. Golf is her active summer sport, but she is an enthusiastic baseball and football fan. She likes to get into the country and get close to nature by weeding or planting in someone's garden. She may even help lay bricks in an outdoor fireplace, just for fun and to learn "another man's work and develop respect of it." Dancing and parties are given due attention in her busy life, during which are seen the gracious and friendly acts of a true leader. Elizabeth Perry seems to know the proper mixture of fun and work as well as the amount of enthusiasm and time each deserves to maintain a balanced outlook on life.—*Helen A. Hunscher, Ph.D., Head, Department of Home Economics, Western Reserve University, Cleveland.*

Nutrition and Arthritis

According to William D. Robinson, Rackham Arthritis Research Unit, University of Michigan, few conditions have the wealth of medical folklore and number of unconfirmed theories that are encountered in the field of rheumatic diseases. High on the list is the belief that in some way diet has something to do with the causation and cure of many forms of arthritis.

Rheumatoid arthritis has been the object of the most intensive search for a nutritional or metabolic aberration. Yet careful studies of carbohydrate, fat, and protein metabolism have shown no abnormalities which can be considered of etiologic significance. The hypothesis that a poorly defined sulphur deficiency was important in this disease has been thoroughly exploded. No major alteration of calcium and phosphorus has been found, although there did appear to be an increased rate of turnover of these minerals and a small increase in calcium excretion.

Although low concentrations of ascorbic acid were found in the plasma of many rheumatoid arthritic patients, the clinical course of the disease was unaffected by correction of this deficiency. In a somewhat similar fashion, the frequent subclinical and less common frank deficiencies of the B-complex have been accepted as accompaniments or consequences of a chronic constitutional disease, rather than a cause.

More general approaches to the problem of diet and rheumatoid arthritis have also given essentially negative results. Bayles, Richardson, and Hall found the diets of thirty-one patients during the year prior to onset of symptoms apparently the same as that of a cross-section of families in the same area. Bauer evaluated seven therapeutic diets in treating the disease and concluded there is no good evidence for the use of any of them in rheumatoid arthritis.

Nevertheless, sound dietary practices common to the management of any chronic systemic disease are necessary to restore caloric balance, provide favorable conditions for rebuilding muscle, and correct any specific deficiencies that may be present. There is no evidence that there is a need for a diet differing in any significant respect from the optimum or ideal diet. Yet it is often of considerable importance to see that the patient actually gets and eats it.—*Abstracted from Nutrition Reviews 7: 33 (February), 1949.*

Current Comment

THE PURCHASE OF FOODS ACCORDING TO SPECIFICATIONS[1]

ADELINE WOOD

Dietary Consultant, Chicago

The importance of the methods used for purchasing procedures cannot be overstressed. It stands to reason that well established specifications for the purchase of food are the first levers of control for the satisfaction of the clientele and for the expenditures for the raw food. For purchasing requirements to be of the greatest value, they should be made according to the financial policies of the organization and based as well on the quality, packaging practices, availability, peaks of seasonal production, and keeping characteristics of the food—all of which are causes for variations in prices.

It is an accepted fact—or at least it should be—that price considerations in the main should be dependent on the specific use and the satisfaction to be derived therefrom. Actually, in good purchasing practice, the aesthetic values and economic factors are not as widely divergent as they may seem. Indeed, it is short of paradoxical that both are based on quality as related to specific use, net yield, and price.

There are no better illustrations of the variations in quality of food stuffs than the grade standards promulgated for the various food commodities by the United States Department of Agriculture and those used in common practice by packers which may or may not be analagous. Be that what it may, these quality standards have two or more grade classifications determined by the minimum or lowest quality requirements for the designated grade. Therefore the specifications or requirements for purchase of food commodities should be established upon the comparison of grades and prices based on specific use and net yields, availability, peak season of production, packing practices, and holding characteristics.

Only those food groups which hold major claims in use in food production and whose purchase give particular difficulty will be discussed, viz., eggs, fruit and vegetables, and meat.

[1] Presented at the Dietetic Section of the Tri-State Hospital Assembly in Chicago, May 4, 1949.

EGGS

The degree of freshness and the size are the determining specifications for eggs as applied to specific use, net yields, and final costs. It is frequently sound practice to use more than one grade and size of eggs as related to final cost. Thus, the degree of freshness is the major specification for eggs for table use with size as secondary, but for general culinary and baking purposes, the size of the egg for the broken yield is of first importance with freshness a close second. For example, for mixture purposes fifteen to eighteen medium size eggs give, on the average, the same net yield as twelve larger eggs.

Freshness is the major determining factor for the quality or grade of eggs and the minimum weight per 30 doz. for the size. It should be emphasized here that weights of eggs are significant, both for freshness and size, and that it is good practice to weigh eggs according to established minimum weight requirements for assurance of freshness, size, and fill of container.

All states provide regulations and varying terminologies for the grade of eggs and several for the size, also. These may or may not be identical with the federal standards. For example, the laws of Illinois provide for grades "A," "B," "C," and "D," which are analagous to the federal grades "AA," "A," "B," and "C," both of which are used in Illinois. The sizes are determined according to minimum weights and are similar for both the state and federal standards. For each specific use, specifications should be established according to these regulations for grade and size. For most of the year, Illinois grade B or the federal grade A, large in size with a minimum net weight of 45 lb. for 30 doz., is a good measuring stick for purchase specifications.

In addition, an important factor in purchasing eggs is the seasonal peak of production of large and smaller size eggs, respectively. For instance, in October and November the markets are flooded with medium size, strictly fresh eggs from the February and March hatch of pullets. On the other hand, it is during this same season, October and November, that larger fresh eggs are at their scarcest, for this is the period of the adult hens' lowest production because of moulting. In the actual purchase

of eggs according to freshness, the size and final cost might well be entirely different in May and June, the season for highest production of fresh, large eggs, than in the fall, and the specifications should be regulated accordingly.

FRUITS AND VEGETABLES

Purchasing specifications for fruits and vegetables, whether fresh, canned, or dried, should be based on the degree of maturity, the kind and amount of defects, the holding characteristics, and packaging practice. It is frequently wise to provide specifications for two or more grades for the same variety of fruit or vegetable—both fresh and processed—according to the intended use. Typical examples are fruits for dessert and vegetables for entrée service in which the degree of perfection in maturity and appearance are the major considerations as compared to culinary use for which net yields, including skill and time for preparation, are of first importance.

Fresh Fruits and Vegetables

About 55 per cent of the fresh fruits and vegetables marketed in long haul transportation are federally graded at the center of packing as "U.S. No. 1," "U. S. No. 2," and "U. S. No. 3." These grades are largely determined by the maximum degree and amount of permissible defects. The relatively few federal requirements for the style of packing are in terms of size, shape, or weight, the outstanding examples of which are apples and potatoes. The only federal standards for containers are capacities for barrels and baskets, but not for fill. It is the amount that is in the container that counts. According to estimates, approximately half of all the containers used for packing and shipping fresh fruits and vegetables are in crates and boxes of varying sizes and shapes, and 20 per cent are in sacks.

Several states, through laws and regulations, packers' and shippers' associations, and area practices have established standards for grades and practices for packing that, on the whole, are more uniform than those of the federal grading service which are purposely designed to meet the nationwide practices. All types and styles are on the market and are good "buys," but purchasing requirements should be established by comparison of specific use, weights, net yields, and final cost.

The importance of comparison of grading standards and packing practices in terms of these three factors are well represented in the practices for grading and packing apples. In the apple producing regions of the Pacific Northwest and in several of the eastern states, apples are packed in standardized boxes closely graded for color and size. The color is indicated on the box by the terminologies "Extra Fancy" (100 per cent), "Fancy" (50 to 75 per cent), and "C" (25 to 35 per cent); size is indicated by stating the number of apples in the box, regardless of color. In those regions in which apples are packed in baskets, they are usually graded according to the U. S. standards. These require for the U. S. No. 1 grade a color perfection of only 50 per cent for all the solid red varieties, for the striped varieties 25 per cent, with only a diameter size for the smallest apple in the package. Many states have regulations for filled weight of apples (as well as for several commodities produced in abundance in their particular area) which, too, are variable.

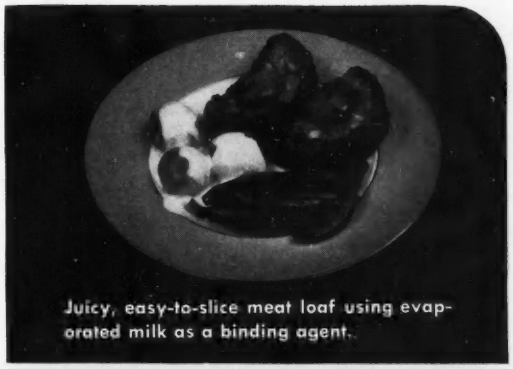
In addition, a word is needed about grading practices in which the grades are indicated by brand names, such as "Sunkist," and "Red Ball" of the California Citrus Fruit Growers Exchange. "Sunkist" represents the top standard grade established by that organization and "Red Ball" the next grade. Others are "Blue Goose," the brand name of the American Fruit Growers, Inc., for both deluxe fruits and vegetables, and the "dozen and one" Florida citrus fruit growers organizations with two or three further brand names for less perfect fruit.

The importance of including grades, the style of package, and the weight or the count in the purchase specifications for fresh fruits and vegetables cannot be overstressed.

Processed Fruits and Vegetables

The quality or grade of processed food at the time of the processing is the specification criterion for this group of food stuffs. Under comparable conditions, the quality that goes into the can, the freezer, the dehydrator, or the pickle media is the quality that reaches the consumer. Further deterioration, if any, usually occurs after the processing is completed, in the handling and the storage if the controls for temperature and humidity are carelessly handled. Some of the most fragile forms, particularly for canned goods, after a time may lose physical shape or take on a metallic taste if canned in tin, and worm infestation may take place in dried fruits. In general, one year is considered the best quality life for all processed fruits and vegetables.

In canning operations, as for fresh fruits and vegetables, the degree of perfection in varietal color and the number of defects are the basis for grading. The practices of the canning industry for grading and filling of containers are analagous to the U. S. standards. The greatest difference is within the grade itself in that the minimum which determines and differentiates the grades has a range of ten points between the top and second grade and fifteen points for each of the next two grades. The grade standards of many packers and distributors are towards the top range of the prescribed grade while others are towards the minimum. The federal requirements for fill are also minimum, both in content and in head space. Industry practices are frequently above these



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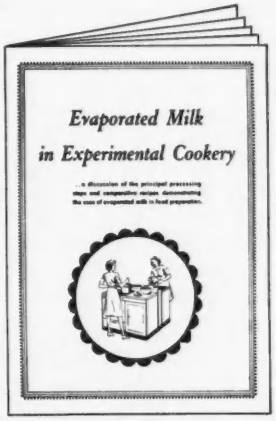

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minimum requirements for grade and fill, and the net content is frequently more than is indicated on the label; others just meet the requirement. Thus, there are variations in net yield and price, and purchasing specifications should be made by comparing similar grades of various canners and distributors as indicated by their individual trademarked brand names and by checking the actual net content, which can be determined by the drained weight or by numerical count, depending entirely on the particular products, as tomatoes and pumpkin versus peach halves or whole plums. It is on these comparisons that a definite purchasing requirement can be established for the brand or brands according to specific use and net yield.

In the actual buying of fruits and vegetables which cannot be counted, uniformity of size and shape should be a definite purchasing standard, and the numerical count should be included in the specifications. For example, a test was made on three lots of pears—all distributed by the same packer, all with the same identification label, all Fancy grade in quality. It was found that because of three different sizes of pears, the count in the can varied. The average count per can for the three lots was 20, 23, and 26 pieces respectively, resulting in a variation in cost of 3 mills per can depending on the lot considered. Over 1800 salads were made. Had all the pears been the smaller size, the difference in total cost would have been approximately $11 less than for the larger pears. If the smaller pears had been so small that two pieces would have been needed for each portion, then it would have been an entirely different story. This is frequently true of varying grades; the service portion often must be the basic consideration. This situation occurs in comparing grades of homogenous mixtures which have high juice content, particularly tomatoes. If such commodities are to be used for entrée service, the drained weights should be considered; if they are to be used for culinary purposes, the total content should be the determining factor in the purchasing specifications. For variation in specific use, it is frequently wise to establish specifications for two or sometimes more grades, as well as for size and styles of packing of the same canned food. This is particularly true for sieve sizes of peas. Larger and less tender peas of the same variety may be preferable for purées or for use in stews, for which the physical weight of the finished formula has a greater crushing effect upon more tender and smaller sizes. Another outstanding example of the need for considering specific use in specifications for style of packing concerns pineapple, where thickness and diameter of cut in the slices vary.

Frozen fruits and vegetables and jellies and jams are usually marketed according to just one brand name of the packer or distributor. Thus the specifications for quality need to be established through comparison of the quality represented by these brand names. Pickled and dried fruits and vegetables, for which the whole forms are maintained in processing, are usually packed according to established standards; for example, size is indicated according to diameter, as crown in raisins, number per pound for prunes, and number of units in the containers for olives and pickles. The media used in processing pickles are not standard, and in establishing purchasing standards, the added requirements should be made after comparing flavors according to the distributor.

Finally, for all fruits and vegetables, the comparison is needed of quality of the fresh and the different forms of processed food and prices, according to peak and low seasons of production for the fresh types. With increased facilities and methods of production, handling, transportation, and storage, increased fresh fruit and vegetable production has resulted in year-round availability. However, there *are* peaks of seasonal availability when the quality is superior, and the reverse is true at the low production point, and prices vary with the supply.

The prices of processed foods are established at the time of packing. The variability, if any, usually occurs when there is a surplus or when stock is low as the new crop approaches. For example, in the Middle West where production of tomatoes and corn is high, there is a time in early autumn when the use of canned tomatoes in any form is waste economy.

At all seasons comparisons should be made of fresh and all processed forms, particularly frozen and canned fruits and vegetables, according to specific use, net yields, and final cost, including time and skill in preparation involved. These comparisons can be made on the comparative basis, using a common denominator of say 10 lb. or a percentage differential in price based on waste in preparation and cost of labor involved.

MEATS

Specifications for meats are of particular importance since meat to the average person is the high point of the main meal and on the average the cost is at least one-third of the total food expenditure. As in all food commodities, the purchasing specification should be based on specific use and net yield in relation to quality and cost.

Whether the whole carcass, untrimmed parts, or trimmed cuts are bought, the specifications should be established on the cut and the style or form to be used. In explanation, the specific use is based upon the methods of meat cookery to be used in relation to the degree of tenderness. This, regardless of age in higher quality meat, varies with the cut according to the location on the carcass; many cuts are comparable in this respect. It is an accepted fact that dry methods of cookery should be used for the most tender cuts and moist methods for the less

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tender cuts of good quality. In practice, however, there is the recognized exception in the style of cutting used in the preparation especially of the less tender cuts, as hamburger and thin slices, cubed.

The specific cut to be used is important in purchasing, not only for tenderness, but in relation to variations in net yield of edible meat and in style of service portions. There are no better illustrations of this than the widely used short chuck and round or leg. In ratio of meat to fat and bone, the short chuck rates higher but in the specific use for slicing and carving, the shape of the bone and the finer texture of the fiber make the leg cuts preferable in attractiveness, uniformity, and number of servings.

The quality or grade of meat is equally important in the specification buying of meats. Fortunately, grading practices are determined entirely on the tenderness or quality, with the amount and character of fat a major determining factor.

A specification requirement based on the industrial and distribution practices for grading and the grade terminologies should be established after comparison of the various grades for tenderness and upon the ratio of fat to edible meat for net yields. In this, great caution must be exercised. For many uses, seemingly excessive fat is more essential for the juiciness of the prepared product than the net yield in the final service. If cuts are used, it can be of great advantage to purchase two or more grades of meat, each for a very definite purpose; for example, one grade of higher fat content for rib roast and another, lower grade for beef stew. Should such practices be used, the grade should definitely be established for the *particular cut*. For entire carcass purchase, only one of the better grades is recommended.

Grades and Terminology

It might be well to review the grading practices and terminologies for meat. The federal grading service is optional and when used, the grade is indicated by the federal stamp placed directly on the meat as "U.S. Prime," "U.S. Choice," "U.S. Good," and "U.S. Commercial." Packers may or may not use the federal grading service and terminologies. In fact, many grade and stamp their meats according to their own standards and brand names which do not necessarily coincide with the federal standards. All are familiar with the brand names, "Star," "Premium," "Certified," and "Puritan," which are comparable to the U. S. Choice grade.

Within a grade, the terms "Top" and "Bottom"—as "Top-Choice" and "Bottom-Choice," and "Top-Good" and "Bottom-Good"—are usually used to indicate the depth of fat, the fat coverings, and linings. In reality, the "Top" of one grade and the "Bottom" of the next highest grade are more similar in quality than the "Top" and "Bottom" within the same grade. It is advisable to make comparisons and resulting grade specifications at either side of the mid-point within the grade. Packers' brand names compare with the U. S. Top-Good, Low-Good, and Top-Commercial grades. U. S. Top-Good and Low-Choice grades are considered good basic standards.

The sex is indicated in the quality and flavor of the meat from animals advancing in age and should be specified in the purchase of beef and yearling lamb. Incidentally, the sex terminologies for yearling lambs are "ewes" for the female and "wethers" for the male; for beef, "steer" for castrated males, "bulls" for uncastrated males which have reproduced, "stags" for males nearing complete sexual development, "heifers" for females nearing sexual maturity, and "cows" for females which have calved. The change in quality in the meat of females approaching maturity is less evident than in that of the males. In fact, the purpose of castration of the young male in beef is for meat purposes. The ewe, yearling lambs, heifer, and steer are good basic standards for sex specifications for lamb and beef.

It almost goes without saying that age of the animal and the quality of feed are highly indicative of the tenderness of the meat and the ratio of edible meat to bone and fat and the shrinkage in cookery.

While breed and feed are highly significant in the carcass weights for meats, the relation between the heavier carcass and the age of the animal at the time of slaughter has a direct bearing on tenderness and ratio of meat to fat and bone. The fat ratio under the same feeding conditions increases with age in an increasing inverse ratio of meat to bone.

In market terms, "lamb" and "veal" are sold according to grade and age (with subclassifications under veal according to type of feed and weight), and beef is sold according to grade, age, and weight. These classifications should be used in specifications. The following are the generally accepted terms:

Lamb: 1 year to 14 months
- Spring lamb, 2 to 9 months, 30 to 50 lb.
- Yearling lamb, 9 to 14 months, 50 to 60 lb.

Mutton: over 14 months, 60 lb. and up.

Veal:
- Milk-fed, Choice grade
  - Light, 70 lb. and under
  - Medium, 70 to 110 lb.
  - Heavy, 110 lb. and up
- Grassers
  - Light, 110 lb. and under
  - Medium, 110 to 165 lb.
  - Heavy, 165 lb. and up

Beef, Good grade
- Yearlings, up to 2 years, 600 to 800 lb.
- Two-year olds, 800 lb. and up

Canned Foods as a Source of Niacin
(NICOTINIC ACID)

No. 5 in a series which summarizes the conclusion about canned foods reached by authorities in nutrition research

Niacin is that member of the vitamin B complex which was formerly known as the "pellagra-preventive" or "P-P" factor. It is a normal constituent of all cells and functions as a component of enzymes in both glycolysis and respiration. (1)

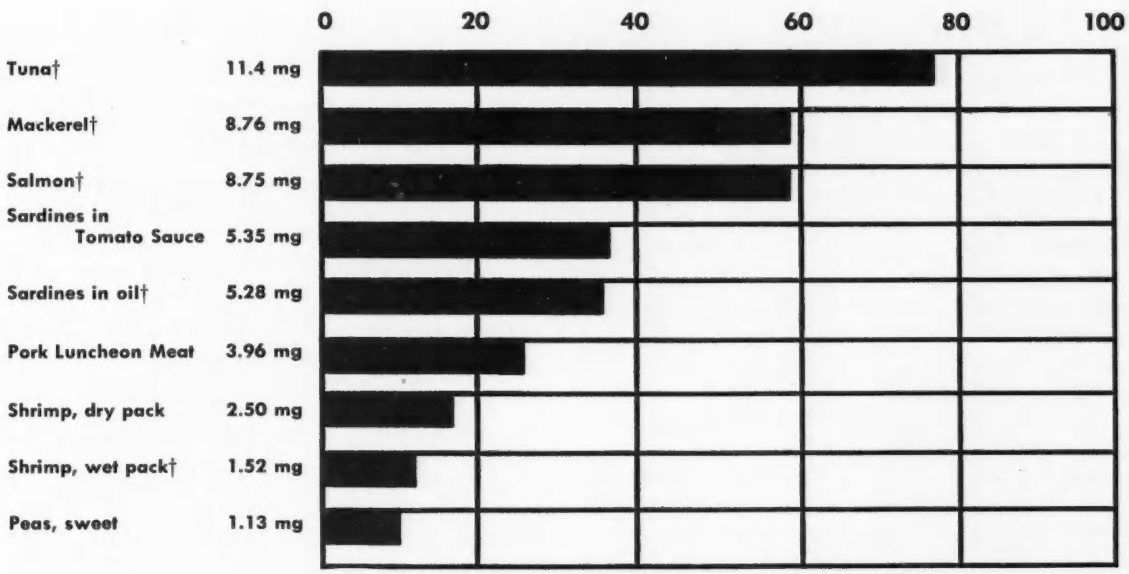
Deficiency of niacin manifests itself in skin lesions, inflammation of mucous membranes, and when extreme, leads to symptoms of florid pellagra. Typical pellagra, however, may be the result of a multiple nutritional deficiency and is treated by the administration of not only niacin, but other members of the vitamin B complex, particularly riboflavin and thiamin. (2) A diet rich in proteins containing tryptophane, which is believed to be a precursor of niacin, is usually recommended. (3)

Meat, fish, cereal and legumes are the best sources of niacin. These foods contain the nutrient in relatively large amounts and the daily allowance can be obtained from a serving of several of them.

Niacin is heat stable so there is a good retention of the nutrient during the canning process. A number of commercially canned foods, in particular canned fish, meat, and legumes are important sources of niacin. (4)

Percentage of Recommended Daily Allowance* in 4-oz. (113 grams) Serving (4)

(Based on analysis of the entire can contents)



†*Brine or oil discarded.*

**Percentage based on recommended daily allowance for physically active male—15 mg.—National Research Council.*

(1) 1943. *Handbook of Nutrition.* A. M. A. Council on Foods and Nutrition. Page 220. American Medical Association, Chicago.

(2) 1945. *Chemistry and Physiology of the Vitamins.* H. R. Rosenberg. Page 246. Interscience, New York.

(3) *Proc. Soc. Exp. Biol. Med.* ***70,*** 569-571 (1949).

(4) 1947. *The Canned Food Reference Manual.* American Can Company. Adapted from pages 251-252. New York.

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It is relatively easy to establish specifications either by weight classification or age, according to carcass weights or parts of carcasses which are dismembered with no trimming. However, even in situations where carcasses are used, cuts or further dismembered and trimmed parts are usually supplemented. The style of cutting and the degree of trim are made according to the practices of the specific area and all too frequently the distributor. In general, the practices for this further cutting or dismembering of the carcass are according to the bone structure and an established "cut" percentage weight of the total carcass weight for primal cuts. The styles of cutting for lamb, veal, and pork are very similar, and the weight of the cut in relation to carcass weight is easily established as 16 to 18 lb. for a leg of veal from a 110- to 115-lb. carcass or 25 to 28 lb. from a 125- to 130-lb. carcass.

The general styles for cutting beef into wholesale cuts are peculiar to the specific area in relation to the point on the carcass for cutting, the established percentage weights, and the degree of trimming. Minimum and maximum weight specifications for beef should be estimated on the percentage basis and accepted trimming practices of the area. Because of greater production, good grade yearling steers are usually more available. For greater yields, it is recommended that the Top-Good yearling steers, toward the heavier side in weight, be used as the basic standard in establishing purchasing requirements.

In summary, specifications for purchasing meat should include: the market terms used for grade, age, the sex for meat from animals advancing in age and sex maturity, carcass weights, and minimum and maximum weights for cuts in relation to these carcass weights—all based on comparisons of cuts for specific use, net yields, and final costs.

Space does not permit the discussion of all food commodities, but for all, even down to pepper and salt, specifications should be established in terms of specific use and comparison with the net yields and the final costs according to quality, packaging practices, and availability.

APPLYING THESE PRINCIPLES

The question now arises, "When does the busy dietitian have the time to do all of the necessary work involved in setting up definite specifications for her particular needs?" First, it cannot be done in one day. But food preparation and consumption is going on every day. No food unit is complete without scales and measures to which should be added a pencil and paper. The work should be planned to go hand in hand with the preparation. No special worker is necessary nor does such a project necessarily add to the work if it is well planned and supervised. In fact, the results are much more practical when applied to regular, daily preparation than if carried on independently of the normal procedures.

Net yields of all commodities to be of greatest value should be kept in some record form. These results can be kept in many ways, the simplest of which is to record the net yield on the form used for the receiving of merchandise, the delivery bill, or the daily journal, if one is kept. Thus, the date and the results of a definite package are recorded. A journal form with commodity classifications is especially usable and efficient from which comparisons, summaries, and conclusions can be made easily and accurately. Monthly summaries are practical for comparison of not only consecutive months, but the same months of consecutive years or seasonal comparisons. It has been stated that keeping records does not necessarily need to be time-consuming. But records, as well as specifications, as with anything else, are valuable only to their degree of practicability and completeness. In food commodities, to keep specifications practical and complete, these suggested procedures (comparisons, tests, and records thereof) must be made continuously and consistently.

Once is not enough, twice is not enough, but a systematic rechecking at frequent intervals is necessary for effective and worth-while specifications for purchasing. In other words, just as in any part of the food production—first attain, then maintain the standards and well described specifications as sound procedures in the purchase of food.

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According to the Hospital Service in the United States, published by the American Medical Association, there were 6,335 government, proprietary, and voluntary hospitals in the U. S. in 1948 with 1,423,520, beds. In 1909, there were only 421,065 beds available in 4,359 hospitals.

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Book Reviews

Fruits and Vegetables for Mid-Morning Lunch. By L. Helen Walters. Minneapolis: The author, Pattee Hall, University of Minnesota, 1949. Paper. Pp. 30. Price 75 cents.

Making Vegetable Soup. By L. Helen Walters. Minneapolis: The author, Pattee Hall, University of Minnesota, 1949. Paper. Pp. 37. Price $1.

These two booklets are unusual in their artistic arrangement of photographs and type. The first—*Fruits and Vegetables for Mid-morning Lunch*—is a nutrition unit for first and second grades. It tells how a group of children in these two grades found their problem and worked on it. For all who work with children of this age, the booklet will be helpful. Clinic dietitians and community nutritionists as well as school lunch personnel will find ideas here on how to interest young children in food and health.

The companion booklet, *Making Vegetable Soup*, is the children's own story of what they did in buying vegetables and making soup. Children will enjoy reading it and the half-page black and white photographs on every page are unusually fine. They show children in action in each step of the project.

Materials for use in nutrition education for children are comparatively scarce. This is a valuable contribution to the field.—*E. Neige Todhunter, Ph.D., Head, Department of Foods and Nutrition, University of Alabama, Tuscaloosa.*

The Sanitation Manual. By Max J. Kleiner and Samuel A. Coleman. New York: The New York State Restaurant Association, 1948. Paper. Pp. 72. Price $2.

This small book has approximately one-third of its pages given to advertising. The remaining discussion may be said to divide itself roughly in four phases: first, problems of the physical plant, including discussion of kitchen floors, walls and ceiling, washrooms and toilets, cellars, ventilation, plumbing, insect and rodent control, and garbage and refuse storage; second, problems of equipment, including that used in dishwashing; third, problems of personal habits; and fourth, food poisoning.

It is obvious that all of the points must be treated in a fairly dogmatic fashion in such a limited treatise. However, the standards established and the advice given seems to be of a very high order. The direct manner of writing gives to the book the usefulness of a handbook. Conversely, in some cases alternative solutions to problems are not suggested, and this might limit the material for some readers.

One small point of question might be the inference that heating food to 190°F. will prevent food poisoning caused by *Staphylococcus aureus*. There is some evidence that once the toxin is formed, it would not be destroyed by this degree of heat.—*Dorothy L. Hussemann, Ph.D., Associate Professor of Home Economics, University of Wisconsin, Madison.*

Fowl and Game Cookery. By James Beard. Garden City, N. Y.: Blue Ribbon Books, 1949. Cloth. Pp. 205. Price $1.

Many gift lists would profit from the inclusion of this book of recipes. Not only are there 100 recipes for chicken, 19 for turkey, and many for duck and goose, but here are also recipes for pheasant, quail, squab, pigeon, partridge, and less-common game birds, such as snipe, woodcock, grouse, and dove. Larger game, including venison, elk, and moose, are discussed, and there are recipes for squirrel, raccoon, and muskrat. This reviewer is curious as to why there are no suggestions for rabbit, one of the most widely eaten small animals.

Opinions dot the recipes and descriptions—proving that Mr. Beard is an opinionated gentleman—but this he acknowledges. He actually puts down in black-and-white the fact that he is a charter member of the anti-lettuce-in-sandwich league.

Some homework, however, has shown that Mr. Beard knows how to write recipes for delicious dishes. Some are contributions from friends, well known in gourmet circles.

A gourmet's library, private or institutional, should surely include *Fowl and Game Cookery*. It would be a gift appreciated by the wife who must prepare the game proudly presented to her by a hunter husband.—*Virginia Monahan Bayles, Instructor in Nutrition and Dietetics, University of Denver School of Nursing.*

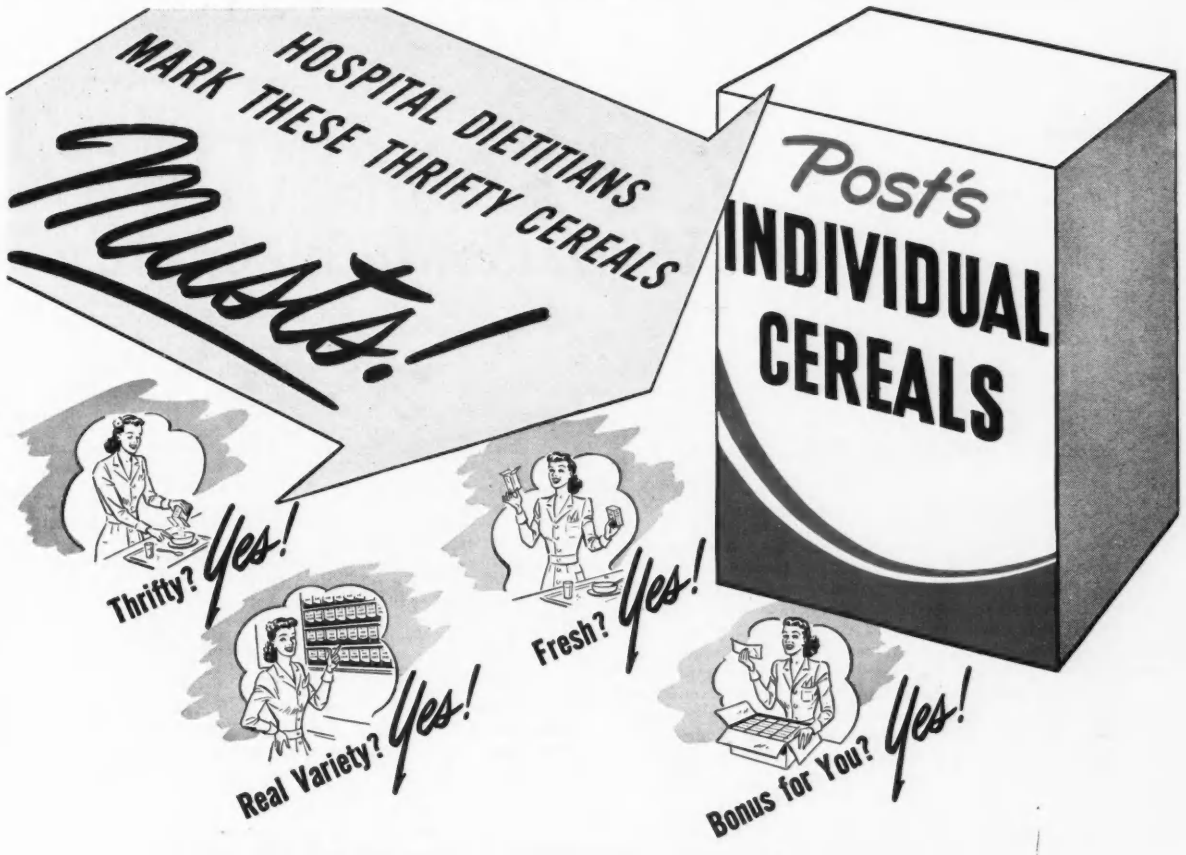
The A.H.E.A. Saga. By Keturah E. Baldwin. Washington, D. C.: The American Home Economics Association, 1949. Cloth. Pp. 108. Price $2.

Subtitled "A brief history of the origin and development of the American Home Economics Association and a glimpse at the grass roots from which it grew," this book will become "must" reading for every dietitian. Home economists in all fields will take pride in the achievements of that organization and will receive from it stimulation and inspiration for further professional endeavor.

The *Saga* is written by one who was for so many years closely associated with all the work of A.H.E.A. and particularly as Business Manager from 1913 to 1945.

The book is in four parts. The first part is a very brief but charming and valuable historical glimpse of high spots in the beginning of what has come to be called "home economics." In Part II information on the "forerunner movements," with a photograph of Ellen H. Richards, is included. In Part III is described the beginning of the Lake Placid Conferences in 1899 and what they did each year up until December 31, 1908, when the American Home Economics Association was organized. The second Conference in 1900 had "hospital dietaries" on the program. Part IV is the largest part of the book and deals with A.H.E.A. itself—its objectives, officers, program, special projects, and activities—a record of which all home economists may well be proud. In Part V are discussed "General Trends in Home Economics," and there is an appendix containing, among other items, well tabulated records of honorary and life members, membership records by years, lists of fellowships, scholarships, and awards and the holders of each.

It is a compact, well organized, and well printed saga of the Association.—*E. Neige Todhunter, Ph.D. Head, Department of Foods and Nutrition, University of Alabama, Tuscaloosa.*



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Current Literature

Contributed by Janette C. Carlsen and Ethel M. Miller, The Johns Hopkins Hospital; Quindara Oliver Dodge, Women's Educational and Industrial Union; and the Journal staff.

AMERICAN JOURNAL OF PUBLIC HEALTH

Vol. 39, August, 1949

* The caries problem of the school child. K. A. Easlick.—p. 983.

Dental Caries and the School Child. The mechanism of the dental caries process is outlined. Six factors are essential for caries: a susceptible patient, acid-soluble tooth enamel, acidogenic bacteria, carbohydrate substrate, a specialized enzyme system, and the bacterial plaque. A number of the control techniques which researchers are testing for interference with each of these factors are reviewed. There is a convincing body of evidence to indicate the validity as control measures of the topical application of sodium fluoride solution and the restriction of fermentable carbohydrates for short periods in children's diets. There is also excellent presumptive reason to anticipate that both the liberation of 1 p.p.m. fluoride in communal drinking waters and the daily use of a combination of an ammonia-liberating dentifrice with a carbamide mouth wash will be developed as routine caries control techniques for children.

THE AMERICAN JOURNAL OF PHYSIOLOGY

Vol. 158, July, 1949

* Influence of previous diet on metabolism during fasting. S. Roberts and L. F. Samuels.—p. 57.

Effect of Previous Diet on Metabolism During Fasting. The ability of the rat, previously force-fed a high-fat diet for six weeks, to survive longer during fasting as compared to similarly treated animals previously maintained on a high-carbohydrate regime appears to be related to the capacity to continue burning mainly fat for energy during the fasting period, thus sparing carbohydrate and protein stores. This was evidenced by an enhanced excretion of acetone bodies in the group fed the high-fat diet, a slower disappearance of blood sugar, and a lowered rate of nitrogen excretion after initiation of the fasting period. On the other hand, the apparent rapid depletion of carbohydrate stores in the carbohydrate-fed animal after the deprivation of food, as indicated by the rapid early decline in blood sugar, was followed by increased utilization of protein for energy. It may be deduced that the earlier death of the animals in the latter group was associated with a more rapid depletion of body protein to the point where there were no longer sufficient quantities of this substance available to satisfy the minimal requirements of the organism.

THE JOURNAL OF NUTRITION

Vol. 38, July, 1949

Carious lesions in cotton rat molars. III. Effect of the particle size and the consistency of the purified ration on the incidence and type of carious lesions. H. H. Shaw.—p. 275.

* Determination of some essential amino acids in several uncooked and cooked Mexican foodstuffs. G. H. Massieu, J. Guzman, R. O. Cravioto, and J. Calvo.—p. 293.

* The enhancement of the nutritive value of wheat gluten by supplementation with lysine, as determined from nitrogen balance indices in human subjects. W. S. Hoffman and G. C. McNeil.—p. 331.

* Vitamin studies in middle-aged and old individuals. III. Thiamine and pyruvic acid blood concentrations. E. Kirk and M. Chieffi.—p. 353.

* Studies on the comparative nutritive value of fats. XII. The digestibility of rapeseed and cottonseed oils in human subjects. H. J. Deuel, R. M. Johnson, C. E. Calbert, J. Gardner, and B. Thomas.—p. 369.

Nutritive properties of protein in different cuts of beef. R. Hoagland, O. G. Hankins, N. R. Ellis, and G. G. Snider.—p. 381.

Amino Acids in Mexican Foods. Nine essential amino acids were determined in corn, tortillas, beans (cooked and uncooked), rice (cooked and uncooked), and pulque, using the microbiologic method. Compared with whole egg, the corn, tortillas, and uncooked rice were deficient in lysine. Corn and tortillas were also deficient in tryptophan and beans in methionine. In preparing tortillas, considerable changes occur in the tryptophan, histidine, threonine, and the arginine content of the corn as determined by microbiologic analysis, using *Streptococcus faecalis*. Beans when cooked show practically no such changes. Similarly, rice remains essentially the same on being cooked. Appreciable quantities of amino acids, especially lysine, were found in pulque.

Improvement of Gluten with Lysine. In ten hospital patients, most of whom had recognizable protein deficiency, a comparison was made of the nutritive value of wheat gluten alone and of the same product reinforced with 4 per cent *l*-lysine. The nitrogen balance index method, utilized by Allison in dogs, was found applicable to these human subjects. The nitrogen balance index, whether determined from the straight line curves drawn from multiple points or from only two points, tended to be constant for the particular protein preparation, whereas the nitrogen requirement for nitrogen equilibrium was more variable. The mean nitrogen balance index for gluten was 0.62. For gluten plus lysine, it was significantly higher, 0.76, approaching the value for casein. Thus, lysine was shown to enhance the nutritive value of gluten for humans, as it had previously been shown to do for animals. In patients with chronic protein deficiency, even unreinforced gluten was found to be capable of producing positive nitrogen balances with moderate intakes.

Blood Thiamine and Pyruvic Acid. An investigation was made of the concentrations of blood thiamine and pyruvic acid in 220 middle-aged and old individuals offered a diet adequate in the B-complex and in twenty-nine younger subjects. A slight tendency was noted for the thiamine value of blood to decrease with age, whereas the pyruvic acid level showed no change with advancing years. No significant correlation was observed between the thiamine and pyruvic acid values in the same individuals.

Digestibility of Fats in Man. The experiments reported

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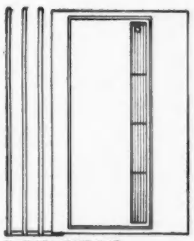

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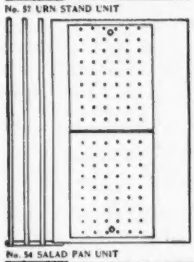

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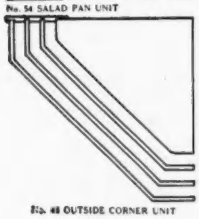

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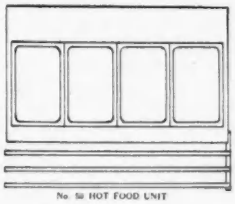

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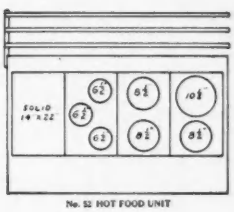

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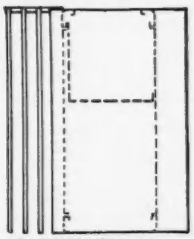

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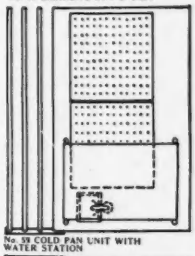

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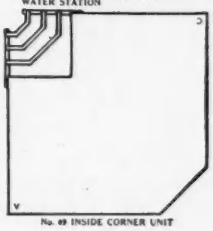

No. 49 INSIDE CORNER UNIT

here were carried out on eight voluntary subjects who were patients at the Rancho Los Amigos, which is one of the units for the chronically ill of the Los Angeles County Hospital System. Some of the subjects were the same individuals who had served in earlier studies where a comparison of the nutritive value of fresh and dehydrated foods was made. They were not suffering from any ailments which would be expected to alter their digestive processes or their nitrogen metabolism. The subjects were confined to a single ward which was used exclusively for the test. A basic diet containing a minimum quantity of fat was employed. The digestibility of rapeseed oil was found to be 99 per cent in normal men, while that of cottonseed was found to be 96.7 per cent when the excretion of soap was considered. While the difference in values between these fats is only slight, it is apparently significant. It results from the somewhat greater excretion of soap in the cottonseed oil tests. The results using rapeseed oil prove that there is a species difference in respect to digestibility between man and the rat.

PUBLIC HEALTH REPORTS

Vol. 64, August 19, 1949

* An epidemiologic study of brucellosis in Minnesota. R. L. Magoffin, P. Kabler, W. W. Spink, and D. Fleming.—p. 1021.

Vol. 64, August 26, 1949

* Fluorine in foods. F. J. McClure.—p. 1061.
* Iodine—a food essential. W. H. Sebrell.—p. 1075.

An Epidemiologic Study of Brucellosis. Available evidence reveals a sharp increase in both human and bovine brucellosis in Minnesota since the period before World War II. An analysis of the data on 268 human cases demonstrates that *Br. abortus* has been the causative organism in about 85 per cent of the cases. The remaining infections, due almost equally to *Br. susi* and *Br. melitensis*, have occurred chiefly in meat-packing-plant employees handling infected swine, though a few cases have occurred in farmers. Approximately half of all cases have been in individuals whose occupation involves contact with livestock or slaughtered animals, and nearly three-fourths have had some contact with farm animals. Adult males between the ages of twenty and fifty-five comprise the bulk of this group. Raw milk has provided the sole source of infection in about one-fourth of all cases. These observations suggest that infection occurs more readily through the skin from handling infectious materials than by invasion through the gastrointestinal tract following ingestion of contaminated milk. Prevention of the human disease is dependent upon eradication of the disease in animals. Pasteurization of all milk would prevent infection in many cases, but there appear to be few practical ways of protecting farmers, packing plant workers, veterinarians, and others who work with infectious animals.

Fluorine in Foods. A survey of recent analytical data for fluorine in foods has been compiled. The majority of foods found in the average diet contain from 0.2 to 0.3 p.p.m. or less fluorine in the food as consumed. Tea and seafoods are notable exceptions, the former containing upward of 75 to 100 p.p.m. fluorine. Cow's milk contains about 0.1 to 0.2 p.p.m. fluorine. Fluorine added to the cow's ration or drinking water has no influence on the milk-fluoride. Fluorine in soil and water has little or no influence on the fluorine content of edible plant produce. Although the data are limited, it appears that natural food-borne fluorine is largely available for body assimilation. Exclusive of drinking water, the average diet appears to provide 0.2 to 0.3 mg. fluorine daily. However, it has been observed that an additional intake of fluorine during formative tooth life, via drinking water containing 1.00 p.p.m. or slightly more, is a distinct advantage to dental health. It is justifiable, therefore, to consider the possibility of a direct dietary supplement of fluoride where the drinking water does not provide a dental optimum quantity of fluorine.

Iodine—A Food Essential. This article contains an excellent discussion of the function of the thyroid gland. Types of goiter and their treatment are also presented fully. The incidence of goiter and relation to iodine is presented, and evidence is given showing that goiter is a problem in the U.S. today. Simple goiter may be prevented by eating food iodine. Study shows that the use of iodized salt is the most effective way of combating this important public health problem. A list of the authorities advocating table use of iodized salt is included.

BAKERS' HELPER

Vol. 92, July 9, 1949

* What you should know about pans and their care.—p. 47.

Care of Baking Pans. Information is given on pan materials, recent developments in pans, and the proper methods of greasing, washing, and glazing. The quality of baked products is influenced by the composition of the pan, gauge of the metal, and how the pans are strapped together, burned out, greased, glazed, or cleaned. Pictured throughout the article are new materials and new designs for baking pans. Contrary to commonly held opinion, washing of baking pans is good for the pans and good for the product. A complete discussion of washing techniques covering use of various compounds deals with hand and machine washing operation.

BUILDINGS

Vol. 49, July, 1949

* Serving the employee.—p. 37.

Vol. 49, August, 1949

* The care and cleaning of marble.—p. 34.

Employee Cafeterias. Pictured and described is an attractive employee cafeteria in an institutional, single-purpose building in New York City. Special features are soundproofing, continuous musical broadcasting, flower boxes, and extensive use of tiles, plastics, and stainless steel. The cafeteria handles a serving load of 1500 persons at a rate of 20 per minute.

Marble. A digest is given of the published handbook by the Marble Institute of America, Inc. Marble surfaces need cleaning frequently. Instructions for cleaning are given for polished interior marble, polished exterior marble, and tooled or sand-finished exteriors. Precautions and the removal of organic stains, metallic stains, and oil grease stains are outlined.

CHAIN STORE AGE

Vol. 25, September, 1949

* Getting the light you pay for. H. Edgar.—p. 31.

Efficient Lighting. The writer describes the maintenance schedule his company has set up for regular replacement of fluorescent lamps on a six-month basis. Lamps, while carrying a two-year life guarantee, lose nearly 40 per cent of their efficiency in as little as sixty days. Flickering tubes damage both transformers and starters and so tubes should never be allowed to reach this stage. All fixture repair and lamp replacement is done for this firm by a contract organization, and a sizeable price advantage is obtained by quantity buying.

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FOOD INDUSTRIES

Vol. 21, July, 1949

* Dextrose will curb color changes in heat-treated acid foods. R. F. Cohee and R. D. Walter.—p. 40.

Army tests reveal how storage affects canned meat flavor. B. W. Gardner, Jr.—p. 51.

* Lug boxes preserved with new resin coating.—p. 71.

New packages and products.—p. 102.

Vol. 21, August, 1949

* Quick recorders of fibrousness in asparagus. A. Kramer.—p. 79.

Dextrose Acts as Color-Change Inhibitor. Reported here is a series of carefully run tests which indicate the role played by dextrose when substituted for a part of the sucrose in curbing the darkening of acid foods. Charts showing the effect upon color and sugar inversion in the presence of acetic, citric, and phosphoric acid are given.

Resin Coating of Lug Boxes. Lug boxes coated with resin and used for tomatoes and olives have been tested by a western food canner and seem to stand up well, repel moisture, and remain free of slime and mold growths.

Asparagus. New equipment—a pressure scale knife and dial and a gauge cutter—has been developed at the University of Maryland for determining the fibrousness of raw and processed asparagus. The "Fibrometer" developed by Wilder determines fibrousness of only canned asparagus; therefore these two new special instruments to record resistance to cutting have been developed for use with fresh asparagus.

HOSPITALS

Vol. 23, August, 1949

* Developing safe techniques in the formula room. M. Gillam.—p. 41.

Developing Safe Technique in the Formula Room. A committee of the American Hospital Association has been studying the problem of safe technique in formula rooms for more than two years in an attempt to develop a procedure that will eliminate the recognized sources of dangers in formula preparation. From this study a manual of procedures and layout for the infant formula room has been devised. In the manual's six chapters, the following basic essentials are discussed and recommendations are made: (a) A bacteriologically acceptable terminally heated formula is one on which a plate count shows less than 25 organisms per milliliter. (b) Terminal heating of completely assembled units (bottle filled, nippled, and capped) can be relied on to produce a bacteriologically acceptable formula. (c) The formula room should be used exclusively for the preparation of formulas. (d) Preparation of formulas should be functionally separated from the cleaning of equipment. (e) Thorough cleaning of bottles and utensils—using chemical detergents rather than soaps—and clean technique are essential (nipples should be presterilized). (f) If thorough cleaning of equipment and terminal heating are employed, presterilization of bottles and sterile technique are unnecessary and, for efficiency of operation, should be eliminated. (g) Cooled formulas should be refrigerated immediately at a temperature of 40° F. to avoid prolonged incubation of any organism surviving terminal heating. (h) Personnel policies should provide for expert supervision of the formula room, periodic health examination of personnel, and observation of proper health practices. Terminal heating, plant and equipment administration, preparation, handling, and control procedures are discussed in detail in this article. Though the principles are applicable to all hospitals, some suggestions for adaptation of procedure, modification of equipment, and use of personnel in the small hospital are presented in the final chapter.

THE NATION'S SCHOOLS

Vol. 44, September, 1949

* Essential equipment for the school kitchen. I. Burba.—p. 64

Essential Equipment and School Needs. The author stresses the need for architects and those in authority during planning and building of schools to recognize the differences between needs in equipment for kitchens in hospitals, profit restaurants, and school lunch programs. Items essential to the school lunch feeding program are: a range, preferably with uniform heat; steam jacketed kettles for soup making; adequate dry storage; and, most of all, adequate refrigeration space for the milk, fruit, and vegetables which are emphasized in the school lunch program. Mechanical dishwashers are becoming a "must" to conform with public health regulations, but if one is not possible, a three-partition sink with work surface for scrapping, stacking, and draining dishes should be provided. Steel and aluminum are the favored cooking utensils.

PERSONNEL JOURNAL

Vol. 28, June, 1949

* The employee publication—where personnel and public relations meet. L. W. Horning.—p. 43.

* Mental health for employees. T. Hayworth and J. Nolan.—p. 52.

Employee Publication. The employee publication is the point at which personnel relations and public relations converge. The company publication has an effect outside the employee family. Through deliberate outside distribution, it is going to find its way into the hands of strangers. Their opinion of the company, even of its products, will be influenced by what they think of the company magazine or newspaper. That is one of several reasons why it is never a good idea to scold, berate, or talk down to employees in their house organ, or to use it as a place for discussing disciplinary matters. Both the company and its employees deserve to be presented in a favorable light in the pages of their company journal. Many of the subjects which management wishes to discuss with employees have definite interest for other groups as well. It is good practice to see that the issue containing the message is sent to other publications which may be interested in it as news or as editorial material. This is an effective means of evoking comment in the general press on issues to be brought before the public as well as before employees. At the same time, employees take greater pride and interest in their company magazine when they see it referred to and quoted in the public press.

Mental Health for Employees. Every worker "leads a double life"—within his company and in his home. Personnel administrators are beginning to recognize the fact that the worker's emotional experiences and adjustments, although entirely outside of company knowledge and control, often finally determine his activities and behavior. Every unhappy employee causes losses in dollars and cents in hidden costs. Individual treatment or counseling is the most direct way of helping workers who have emotional and adjustment problems. Another less direct attack on the problem is the increasing emphasis on the improvement of worker attitudes and on "human relations" in supervisory training programs. Some of the general and specific objectives of a mental health program should be: to increase the production of the average group of workers; to bring workers now marginal in productivity into the average group; to improve general worker morale by increasing emotional satisfactions; to recognize the individual workers who require and want personal counseling and refer them to professional facilities for help; to reduce the volume of human relations problems of supervisors; and to improve community relations by helping with an important community problem.

Your Pin-Up Guide to Special Breakfasts

HIGH VITAMIN DIET. Crisp *Kellogg's PEP* supplies more thiamine than found in whole wheat and is fortified to supply 400 I. U. of Vitamin D per ounce!

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WHEAT ALLERGY DIET. Serve *Kellogg's Corn Flakes* or *Kellogg's Rice Krispies* for a crisp, delightful breakfast. Even the malt used for flavoring is wheat-free.

HIGH RESIDUE DIET. Nut-sweet *Kellogg's All-Bran* for constipation due to lack of bulk in the diet. About 8% wheat bran fiber, 3.3 mg. of available iron per ounce!

MEDIUM RESIDUE DIET. *Kellogg's 40% Bran Flakes* contains 4% wheat bran fiber to help regularity. Crisp! Sweet! Whole-wheat values of thiamine, niacin, iron!

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HIGH CALCIUM DIETS. *All* Kellogg's cereals help build calcium intake! An ounce of *Kellogg's Raisin Bran,* with ½ cup of milk, gives about ⅙ the daily requirement of calcium.

For a better breakfast better eat Kellogg's

News Notes

A.D.A. Officers and Executive Board for 1949–50. On October 14, at the Annual Banquet of the American Dietetic Association, held at the Cosmopolitan Hotel, Denver, the outgoing officers and section chairmen of the Association turned over the administration to a new group. Members of the 1949–50 Executive Board, which includes elected officers are:

President: Elizabeth Perry, Chief Dietitian and Assistant Superintendent, City Hospital of Cleveland.

President-Elect: Dr. Lillian Storms Coover, Nutrition Consultant, Gerber Products Company, Fremont, Michigan.

Vice-President: Fern W. Gleiser, Professor of Institution Economics and Management, University of Chicago.

Secretary: Dr. Margaret A. Ohlson, Professor and Head, Department of Foods and Nutrition, Michigan State College, East Lansing.

Treasurer: Winifred Howard Erickson, Director of Dietetics, Ancker Hospital, St. Paul.

The Section Chairmen for the coming year are:

Professional Education Section: Dr. Ercel S. Eppright, Head, Food and Nutrition Department, Iowa State College, Ames.

Diet Therapy Section: Marguerite Pettee, Chief Nutritionist, Medical College of Virginia, Richmond.

Food Administration Section: Marion D. Floyd, Director of Dietetics, Massachusetts General Hospital, Boston.

Community Nutrition Section: Dr. Gladys Kinsman Lewis, Nutrition Consultant, Colorado State Department of Public Health, Denver.

Major Perry Heads Air Force W.M.S.S. The Air Surgeon General's Office has announced that Major Miriam E. Perry has been appointed Acting Chief of the newly created Women's Medical Specialist Service of the U. S. Air Force Medical Service. In that capacity, she will be responsible to the Air Surgeon General on administrative matters concerning the new W.M.S.S., on matters of hospital food service, and for recommendations on personnel policies and procedures. Major Perry is a graduate of Simmons College, Boston, and has been an Army dietitian since 1938. Prior to her assignment with the Air Force, she was stationed at Brooke Army Medical Center, San Antonio, Texas.

As of October 4, thirty-eight dietitians had been transferred from the U. S. Army to the new Air Force Women's Medical Specialist Service. They are listed below.

Dietetic Interns Graduate. Seven dietetic interns received their diplomas and pins on August 29 from *Stanford University Hospitals*, San Francisco, at a dinner given in their honor. They are: Alice A. Wise, University of Wisconsin; Margie Ro McDonald, University of Oklahoma; Dorothy Banghart, University of Denver; Margaret Lay, Louisiana Polytechnic Institute; Mary S. Galvin, Colorado A. & M. College, Marilyn Lunde, University of Washington; and Marcella Dyson, Louisiana State University. Helen B. Walsh, President of the American Dietetic Association, was a guest at the dinner.

Graduation exercises were held September 13 at *Kennedy Veterans Administration Hospital*, Memphis, for

Personnel, U. S. Air Force Women's Medical Specialist Service

Major General Malcolm C. Grow, The Surgeon General, U.S. Air Force, has announced the transfer of the following thirty-eight dietitians to the newly created Medical Service of the U.S. Air Force:

Name	Assignment
	Major
Perry, Miriam E.	Acting Chief, Women's Medical Specialist Service, U. S. Air Force, Washington, D. C.
	Captains
Brice, Virginia N.	Wm. Beaumont General Hospital, El Paso, Tex.
Carlson, Christie L.	Ladd Air Force Base, Alaska
Creech, Kathleen	Tripler General Hospital, Hawaii
Delaney, Isabelle	Brooke General Hospital, Fort Sam Houston, Tex.
Dubar, Isabelle G.	En Route to Japan
Folmar, Evelyn	34th General Hospital, APO 331, San Francisco, Calif.
Harman, Thelma A.	Brooke General Hospital, Fort Sam Houston, Tex.
Horr, Frances M.	Wm. Beaumont General Hospital, El Paso, Tex.
Knox, Alice T. A.	Percy Jones General Hospital, Battle Creek, Mich.
Marsh, Kathryn M.	22nd General Hospital, APO 246, San Francisco, Calif.
Moore, Marie W.	361st Station Hospital, APO 1055, San Francisco, Calif.
Moore, Sue W.	Rodriguez General Hospital, San Juan, Puerto Rico
Ramsay, Ruth P.	Fort Riley, Kans.
Ryan, Barbara M.	Fort Monmouth, N. J.
Skellchock, Julia V.	Fort Ord, Calif.
Spring, Gladys M.	Tripler General Hospital, Hawaii
Thompson, Mary L.	Eglin Air Force Base, Fla.
Yancy, Mary L.	Camp Campbell, Ky.
	First Lieutenants
Barnes, Maude M.	161st Station Hospital, APO 1066, San Francisco, Calif.
Casey, Ann R.	Bolling Air Force Base, Washington, D. C.
Claybrooke, Charlotte	Camp Lee, Va.
Fanning, Mary C.	Valley Forge General Hospital, Phoenixville, Pa.
Gasson, Frances M.	Sheppard Air Force Base, Tex.
Goodale, Harriet J.	Lackland Air Force Base, Tex.
Greene, Helen A.	Walter Reed General Hospital, Washington, D. C.
Hanratty, Alice C.	Scott Air Force Base, Ill.
Hayton, Marian J.	Tripler General Hospital, Hawaii
Hill, Edith A.	Brooke General Hospital, Fort Sam Houston, Tex.
Horack, Mary C.	Fairfield-Suisan, Calif.
Motley, Dellamae	Keesler Field, Miss.
Partridge, Carrie L.	130th Station Hospital, A.P.O. 403, New York, N. Y.
Schneider, Joan N.	Oliver General Hospital, Augusta, Ga.
Smith, Frances E.	Chanute Air Force Base, Ill.
	Second Lieutenants
Bales, Betty L.	Brooke General Hospital, San Antonio, Tex. (Dietetic Intern)
Lacy, Barbara L. F.	Brooke General Hospital, San Antonio, Tex. (Dietetic Intern)
Metzler, Roberta K.	Brooke General Hospital, San Antonio, Tex. (Dietetic Intern)
Northrup, Barbara L.	Brooke General Hospital, San Antonio, Tex. (Dietetic Intern)

Army Announcements Concerning Personnel

Ouida Weimer, R-2523, has been promoted to the rank of First Lieutenant from Second Lieutenant

Margaret L. Beck, R-2566, has been appointed Second Lieutenant in the Women's Medical Specialist Corps Reserve.

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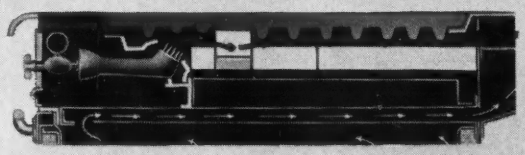

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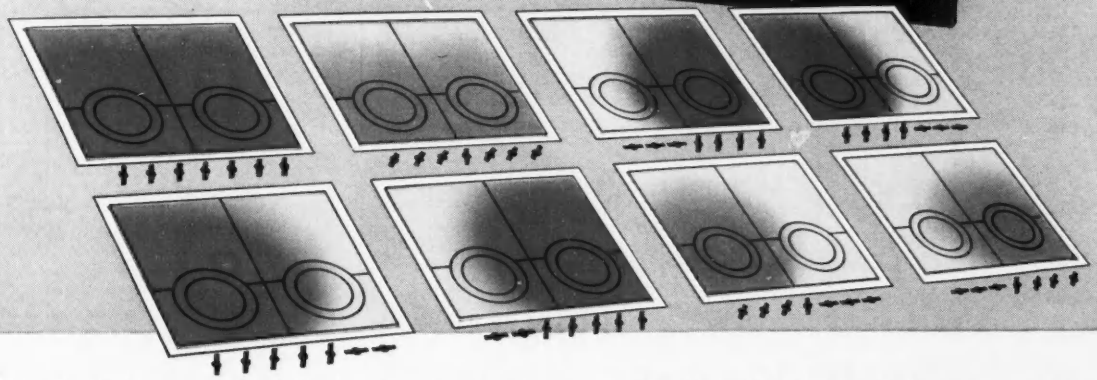

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the following nine dietetic interns: Sarah M. Carpenter, Georgia State College for Women; Rose Eva Diltz, Oklahoma College for Women; Marilyn Evans, Louisiana Polytechnic Institute; Clara Mae Hall, Georgia State College for Women; Elizabeth A. Jackson, Georgia State College for Women; Mary G. Lawson, Maryville College; Margaret J. Maloney, St. Marys of the Woods; Gracia Oliveira, Texas State College for Women; Doris W. White, Madison College. Dr. E. Neige Todhunter, Head of the Department of Foods and Nutrition at the University of Alabama was the guest speaker. Following the graduation exercises, the dietetic staff honored the graduates with a tea.

The following dietetic interns completed their year's dietetic internship September 30 at *Multnomah Hospital*, Portland, Oregon: Gloria Sampson, Montana State College; Norma Walker, University of Washington; and Nobi Okano, Iowa State College. A dinner was given for the graduating interns at which pins and certificates were presented.

AHA Elections. The new President-Elect of the American Hospital Association chosen at that organization's convention in September is Dr. Charles F. Wilinsky, Director, Beth Israel Hospital, Boston. At the same time, John N. Hatfield of Philadelphia took over the duties of President.

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FAO News. November 21 will mark the Fifth Session of the FAO Conference to be held in Washington. It will be organized in three commissions as it was last year: I, World Review and Outlook; II, Program of Work of FAO and National Programs of Governments; and III, Constitutional, Administrative, and Financial Questions.

New Canadian Dietary Standards. The September issue of *Canadian Nutrition Notes* is devoted to the new dietary standards recommended by the Canadian Council on Nutrition last December. Not only are the new standards given, but the revised "Food Rules" as well. The new standards are based on "body size" and no "margins of safety" are allowed. The tables are expressed for juveniles and adults, according to the degree of activity as well as body weight.

Plentiful Foods. The November list of plentiful foods released by the U.S.D.A. includes:

Fresh fruit and produce

Apples	Grapes
Cauliflower	Nuts (tree)
Cranberries	Pears, winter

Meats and poultry

Chickens
Turkeys
Pork products

Miscellaneous foods

Beans, dried	Honey
Corn, canned	Molasses
Dairy products, manufactured	Peas, dried
	Prunes, dried
Eggs	Raisins, dried
Fats, cooking	Sugarcane sirup

It is urged that apples, turkeys, and cranberries should be given special stress in November.

Booklet on Diet for the Aging. The Community Service Society of New York has recently published a 25-cent booklet titled *Foods for Health as We Grow Older*. Written in easy-to-read style, it is suitable for the professional person to distribute to patients. Not only is the necessity of eating an adequate diet explained, but consideration is given to the person's individual situation. A general basic master meal plan is presented, which is followed by discussions of under- and overweight, as well as "When Appetite is Poor."

One section deals with eating problems when chewing is difficult, and a meal plan is suggested for this type of situation. The problems of budgeting, eating with the family, and eating in restaurants are recognized and dealt with, as well as that of preparing meals, both when a kitchen is available and when there is no refrigerator.

Manual on Infant Formula Room Operation. A new American Hospital Association publication provides hospitals with a guide to the proper organization and operation of the infant formula room. Titled *Manual of Procedures and Layout for the Infant Formula Room*, the manual outlines eight basic essentials

For patient trays . . .

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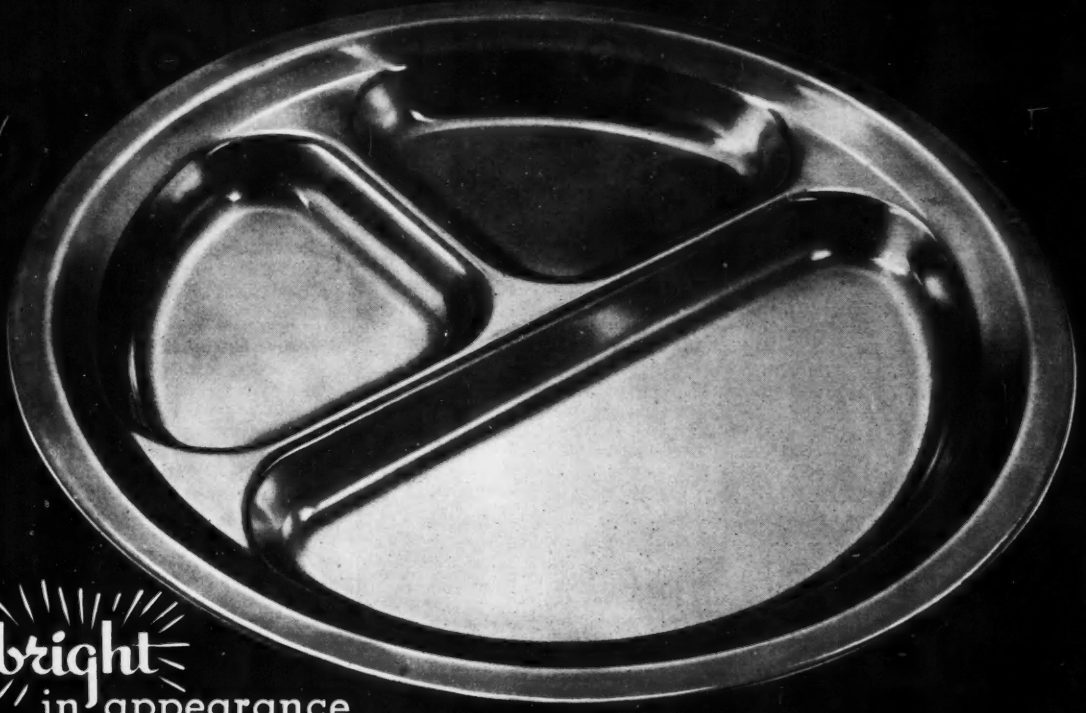

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important in the preparation of safe feedings. Each of these essentials is defined, described, and evaluated. The publication of this manual is the result of many months' research and study on the part of a committee made of of hospital, medical, industrial, and public health representatives.

U.S.D.A. Turkey Publication. An interesting bulletin has been prepared by the Bureau of Human Nutrition and Home Economics, Agricultural Research Administration, entitled "Turkey on the Table the Year Round." It contains helpful buying guides, seventeen recipes for turkey dishes, and clear illustrations of various methods used in preparing and cooking turkey. The publication may be purchased for 10 cents from the Superintendent of Documents, Washington.

Thank You. In response to the plea published in the August issue of the JOURNAL, a number of dietitians have forwarded to the Association office back copies of the JOURNAL, the supply of which was depleted. This fine cooperation is greatly appreciated, and we want to thank those members and subscribers who have sent their old JOURNALS to the office.

Caloric Intake and American Food Habits. According to nutritionists at the Department of Agriculture, the average American gets nearly a third o his calories from fats, sugars, and alcohol. This eating habit is costly both in terms of money and in terms of health, for such foods offer little in the way of nutritive value except calories, whereas many other foods include essential protein, vitamins, and minerals as well. Thus, "straight" energy foods provide costly calories. These workers also point out that the people who eat high caloric foods are likely either to have an inadequate intake of other nutrients, or to overeat and thus become obese. On the other hand, most people who eat a balanced diet which meets protein, vitamin, and mineral needs are usually satisfied and feel little need for eating high caloric foods; nor do they need extra cash with which to purchase such foods.

Pressure against foods which offer little but energy is being increased from several directions. Physicians are stressing the dangers of overweight and its relation to longevity, diabetes, and cardiovascular disease. Dentists are pointing out the caries-producing qualities of excess sugar, and high prices are making the housewife anxious to get the most food value for her money.

Peanut Butter Rival. New uses for the filberts or cultivated hazelnuts have been developed at the Oregon Experiment Station. Oil-roasted, peeled filberts make butter of excellent color and flavor by the general methods used for making peanut butter. The scientists believe that filberts must be ground to the fineness of smooth peanut butter, because texture of a nut butter may influence the consumer as much as flavor. For a good spread, they recommend using three parts of filbert nuts and one part of roasted ground wheat.

Frozen Apple Drink. The U.S.D.A. has recently announced the development by Dr. W. V. Cruess of the California Experiment Station of a new apple drink in the form of frozen apple concentrate. It can be sold in cans from frozen food cabinets in grocery stores, and it can be made up into a cold fresh apple drink by mixing three cans of water with one of the concentrate. Thus it is similar to the frozen orange juice concentrates which have gained so steadily in popularity recently.

Color Change in Canned Fruit Juices. Color deterioration in stored fruit juices is due more to heat and oxygen than to light, according to findings of the Massachusetts Experiment Station. Research to learn the cause of fading, darkening, browning, and other changes in color in canned grape, tomato, cherry, currant, raspberry, strawberry, and blueberry juices has shown that cool storage protects the color of the juice far more than dark storage, and that deaerating protects the juice from contact with oxygen and thus saves change in color due to oxidation.

During six months' storage, all seven juices showed some change in color, but those with naturally high color—blueberry, strawberry, raspberry, and currant juice—suffered most, in that order. Cherry, grape, and tomato juice were more stable in color. During the first

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three months of storage little change in color occurred; then the bright clear red turned light and dull, and later—usually after about six months—darkening took place.

In studying apple and cherry juice, it was learned that the addition of ascorbic acid helped to prevent browning and other discoloration. In tomato, cherry, currant, raspberry, and strawberry juices, ascorbic acid had a bleaching effect, however. It appeared to have little or no effect on blueberry or grape juice.

Storage of Non-Fat, Dry Milk Solids. In an investigation at the Michigan Experiment Station, Pauline Paul found that the best and most convenient container for keeping dry milk, once it has been opened, is one which can be tightly closed. She found that in tight glass jars, dry milk stored for a year on the kitchen shelf was still acceptable, while that which had been kept in an unsealed Cellophane package had gradually absorbed moisture from the air and by the ninth month was inedible. It had caked, turned yellow-brown, and changed in flavor. However, the Cellophane-packaged dry milk stayed in good condition when kept in the refrigerator for a year.

News of State Associations

Iowa Dietetic Association. The annual fall meeting of the Iowa Dietetic Association will be held on November 8 at Iowa State College, Ames. The program will include reports of the A.D.A. convention in Denver, of the Upper Midwest Hospital Conference, and a talk on Association affairs by Lillian Storms Coover, A.D.A. President-Elect. Dr. George Wadsworth, as guest speaker, will discuss work being done at Woodward State Hospital and School, and two other speakers are expected to discuss current nutrition research.

Officers of the Iowa Dietetic Association are: President, May Morris, Des Moines; President-Elect, Helen Goodenow, State University of Iowa, Iowa City; Vice-President, Mary June Carter, Children's Hospital, Iowa City; Secretary, Sister Grace Marie, Xavier Hospital, Dubuque; and Treasurer, Grace Shugart, Iowa State College, Ames.

The *Mississippi Valley Dietetic Group* met in Clinton on October 26 as guests of the Clinton Industries, Inc.

Kansas Dietetic Association. New officers of the *Kansas City Dietetic Association* are: President, Patricia Payer, University of Kansas Medical Center; Vice-President, Mary Catherine Male, St. Luke's Hospital; Secretary, Dorothy Hopkins, General Hospital; and Treasurer, Pauline Kegereis, Children's Mercy Hospital.

Officers for 1949–50 of the *Topeka Dietetic Association* will be: President, Mary Alice Streator, Sante Fe Hospital, and Secretary-Treasurer, Mary Zoe Stahl, Winter Veterans Administration Hospital.

Massachusetts Dietetic Association. A printed program of the monthly meetings for 1949–50 has been issued by the Massachusetts Dietetic Association. In October, the group heard a paper by Dr. Garrett L. Sullivan, General Director, Boston Eye Bank, on "The Miracle of Sight Restoration Through the Eye Bank." In addition, a quiz contest on "Know Your M.D.A." was conducted, and Dr. Helen S. Mitchell discussed "A.D.A. Plans for the Future." The November meeting was devoted to a report of the A.D.A. convention and included, as well, a color film on Colorado.

The pre-Christmas December meeting will be titled "New England States Night," for which a six-state dinner will be held at Schrafft's. The featured speaker will be Dr. Norman Jolliffe whose topic will be "What's News in Nutrition."

A panel discussion on "Group Dynamics in Diet Therapy" is planned for January, with dietitians, a psychologist, a psychiatrist, and an internist as participants.

In February, the Dietetic Association will hold a joint meeting with the Massachusetts Home Economics Association, the subject of which will be vocational guidance. The March meeting will also be a joint meeting—with the New England Hospital Assembly. The M.D.A. plans to present Charles V. Wynne, Superintendent, Waterbury Hospital, Waterbury, Connecticut, who will discuss "Modern Thinking in the Dietary Department." A third joint meeting will

Boontonware

FROM 2 POINTS OF VIEW

THE CUSTOMER SEES new color in table settings of Boontonware — soft appealing shades — pastel blue, yellow, green or buff — somehow the table looks nicer — the food, more appetizing. It's easier to talk; less clitter clatter round about. The customer makes a mental note to come again.

THE MANAGER SEES Melmac* ware at its best in design and durability as he looks at his Boontonware. Up to 90% savings on previous breakage costs prove this to him. He sees how the ware's light weight has lifted a great fatigue-load off kitchen, table and counter service employees alike. Now that he has tried it, he sees that it's NEW; that it's progress in dishware — that it's not just a substitute.

Because of the many savings it has brought him, he's more than willing to give it the extra washing care it deserves. He sees that recommended detergents, especially the new liquid CHAT*, do much to eliminate water spotting and staining which have always been problems with any kind of dishware. The manager is glad that he didn't just ask questions; that he tried Boontonware.

*Reg. U. S. Pat. Off.

Available at leading Hotel, Restaurant and Hospital Supply Dealers, or write to:
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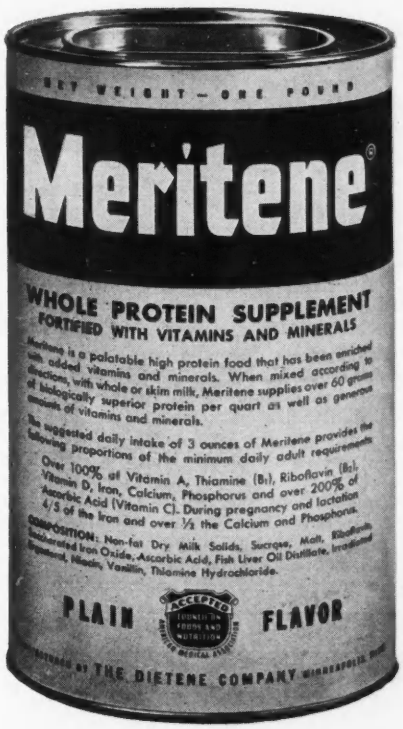
PARKER D. PERRY INCORPORATED
729 Boylston Street, Boston 16, Mass.

Boontonware
It lasts and lasts and lasts

Solve the Protein Taste Problem with...



MERITENE tastes so good that patients really enjoy taking it. Just 3 ounces of MERITENE, mixed with milk, will provide over 50 extra grams of whole protein in your patient's daily diet. MERITENE is available in one-pound cans, plain or chocolate flavor, at only $1.65 per pound. Special prices to hospitals on 5- and 25-lb. cans.

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be held in April, this one with the Massachusetts Public Health Association. This meeting will consist of a panel discussion on the "Role of the Institutional Dietary Consultant.

The last meeting of the year in May will be an all-day meeting which will include election of officers and work sessions to determine "What Do You Expect from Your M.D.A.?"

Officers of the Massachusetts Association for 1949–50 are: President, Alice M. Fenno, Harvard University; Vice-President, Lillian Myers Reiner, Beth Israel Hospital; Secretary, Ruth C. Cottrell, Peter Bent Brigham Hospital; and Treasurer, Grace M. Covey, Veterans Administration. The section chairmen are: Community Nutrition, Beatrice Rubin, Beth Israel Hospital; Diet Therapy, Elma Seibert, Massachusetts General Hospital; Food Administration, Jean Gump, Harvard University; and Professional Education, Helen Baughman, Peter Bent Brigham Hospital. All officers and section chairmen are from the Boston area.

Minnesota Dietetic Association. The fall meeting of the Minnesota Dietetic Association will be held November 12 at the College of Saint Catherine's, St. Paul. A luncheon and tea are included in the day's program.

The plans for the meeting include a talk by George LeSavage of Richards-Treat Cafeteria on training employees and a discussion by Dr. Dorothea Raudusch of the relation of nutrition to dental care. A third speaker will talk on the Minnesota mental health program.

Convention reports will also be given by the delegates who attended the 32nd A.D.A. Annual Meeting in Denver in October.

New York State Dietetic Association. The *Rochester Dietetic Association* opened its fall program with a social meeting at the Rochester General Hospital Nurses Home on September 20. Officers and chairmen for the coming year are: President, Helen K. Griffith, Rochester General Hospital; Vice-President, Priscilla L. Hewey, Eastman Kodak Company; Secretary, Margaret Frederick, Strong Memorial Hospital; Treasurer, Ferne King, Rochester Institute of Technology; Food Administration Chairman, Mabel Champlain, University of Rochester; Diet Therapy Chairman, Sadie Lipman, Highland Hospital; and Community Nutrition Chairman, Edna Byrnes, St. Mary's Hospital.

Pennsylvania Dietetic Association. The Scholarship Loan Fund has announced that Doris Busche, an intern at Shadyside Hospital, Pittsburgh, has been awarded the Pennsylvania Dietetic Association's scholarship for this year.

Contributions received from local associations in Pennsylvania were used to make up an exhibit on public relations and vocational guidance for the A.D.A. convention in Denver. The exhibit included press notices about dietetic interns, the A.D.A. vocational guidance publications, as well as activities of the Association. Pittsburgh dietitians, in addition, sent news stories about a Symposium on Cooking in which the Pittsburgh Dietetic Association members were joined by the Home Economists in Business and the Business and Professional Women's Club. Philadelphia also contributed a story about the $2 million grocery bill of the school cafeterias and how the food is distributed and purchased.

The Northeastern Dietetic Association held its first meeting of the year at Shawnee-on-the-Delaware.

The September meeting of the *Philadelphia Dietetic Association* was held at Friends' Hospital. Representatives of Trans-World Airlines showed a color travel film of the Mediterranean. Other programs for the year have been planned to interest all members. Conducted trips to a baking company and a packing plant have been arranged, and invited guest speakers will include: public health nurses, medical students, hospital administrators, school nurses, and home economics students. In the spring, the Philadelphia group will join with the Pennsylvania Dietetic Association for a closing banquet. Plans are also being made by the Diet Therapy Section for participation in the Annual Forum on Diabetes which is presented by the Philadelphia Metabolic Association during National Diabetes Detection Week.

West Virginia Dietetic Association. Officers and section chairmen of the West Virginia Dietetic Association are: President, Ona Frances Stinson; Vice-President, Eloise Cofer; Secretary, Vera Thomas; Treasurer, Mildred Kent; Diet Therapy Chairman, Ruth Mathews; Community Nutrition Chairman, Eloise Cofer; Food Administration Chairman, Betty Jo Sullivan; and Chairman, Professional Education Section, Marian McKenzie.

Wisconsin Dietetic Association. The 1949–50 officers of the Wisconsin Dietetic Association are: President, May Reynolds, University of Wisconsin, Madison; President-Elect, Iva Welch, Lawrence College, Appleton; Vice-President, Elizabeth Sullivan, National Dairy Council, Milwaukee; Secretary, Hedwig Poehler, Milwaukee Health Department and Muirdale Sanitarium, Wauwatosa; and Treasurer, Ruth Humboldt, Wauwatosa. The section chairmen are: Diet Therapy, Dagmar Toumin, Milwaukee County Institutions; Community Nutrition, Norma Dolan, Milwaukee County Institutions; Professional Education, Vera Kerstell, St. Mary's Hospital, Wausau; and Food Administration, Ruth Dickie, Wisconsin General Hospital, Madison.

The Northeastern Wisconsin Dietetic Association will meet in Wausau on November 12, with Hedwig Poehler, Milwaukee Health Department Nutritionist, and Grace Towell, Chief Dietitian, St. Luke's Hospital, in Milwaukee, as featured speakers.

FOR THE DIABETIC
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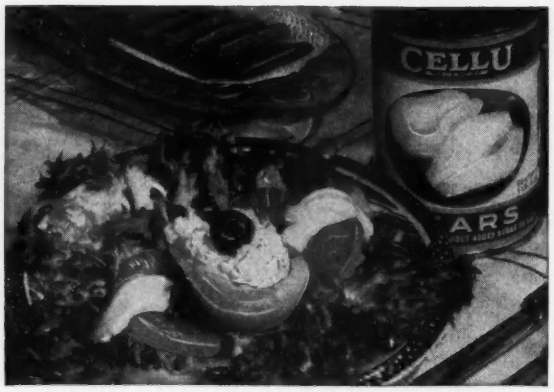
UNSWEETENED FRUITS
PACKED IN WATER



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